DESIGN ACTIVE

DESIGNING FOR ACTIVE LIVING → HEALTHY INDIVIUALS → BETTER COMMUNITY

ALYSSA M. STROH

figure 1.0 - clipart

[DESIGN ACTIVE]

A Design Thesis Submitted to the
Department of Architecture and
Landscape Architecture of
North Dakota State University

By

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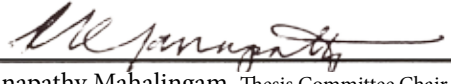
In Partial Fulfillment of the Requirements
for the Degree of
Master of Architecture

Mike Christenson, Primary Thesis Advisor



Dr. Ganapathy Mahalingam, Thesis Committee Chair

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Fargo, North Dakota

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ABSTRACT

The way in which one's environment is built has a strong influence on the individual and community as a whole. Societies across America are very diverse depending on geographical location, resources, economy, climate, and numerous other aspects that work together to influence who we are and how we work with one another. One source of influence that can easily be overlooked when analyzing the various elements used to build each individual and community is the built environment.

This thesis will examine the relationship between the built environment and the influence it has on the health of the community. It will analyze specific elements of design used to increase activity and health awareness within a community. The project will further discover successful building typology used in designing for an active community. The resulting design of the research is a community wellness center that provides an outlet for community members to engage in an active lifestyle and in turn, seek to improve the quality of life and community.

KEY WORDS: *built environment* *active lifestyle* *community wellness*

How does the ***built environment*** influence an ***active lifestyle*** in the ***community*** and how can it be deisgned to increase activity and promote ***healthy individuals*** and ***communities***?

America is known as the obesity capitol of the world; and today's generation is labeled as the "fast food generation." We have succeeded in becoming busier, fatter, and less social than ever before. Obesity has not only effected the physical health of thousands of Americans; but has bled into the mental, social, and spiritual condition of so many Americans today. The quality of life has been slowly diminishing over the years in the United States. Crime rates are continually on the rise, suicide rates are increasing, and people are turning to drugs and alcohol to find fulfillment in their life because their self-worth has disappeared.

Many of the problems we face in America today are a direct reflection of the lack of a physically active lifestyle in society. Physical activity does more than help lose weight and increase the physical well-being of an individual. It boosts our energy and mental state of mind. Those who exercise are far happier in life and tend to make other healthy choices. Physical activity also increases social life and unity within a community. Being physically active brings families together, provides youth with healthier options for entertainment, and gives people in a community an option to come together outside of the home. American communities desperately need a turnaround in their society, and it all starts with the children.

NARRATIVE (CONT)

The youth of the younger generations have become kings and queens of social media and connections; yet they are the most lonely and unconnected generation in all of history. Advancements in technology have been making it easier and easier to become less and less social and physically active. A majority of children today would much rather sit at home on the computer or watch television than do any form of exercise. I have had my fair share of babysitting over the past 10 years and have learned from much experience that it takes a great effort to get any child excited about going outside or doing something more active than sitting on the couch staring at a screen all day.

I have always had a passion for sports and staying active in my life; but I found it rather difficult to do growing up in a small town in rural ND. It wasn't until my first year in high school that a wellness center was built in my hometown. Through a combination of different sports and a membership to the wellness center, I had managed to stay fairly active in high school. Once I reached college and came to Fargo to attend school at NDSU, I found my passion for active living increase even more. The NDSU Wellness Center had caught my attention right away from the first time I visited the campus. I fell in love with the four floors of endless opportunities any student can have to be involved, be active, and stay in shape. There is so many possibilities that the NDSU Wellness Center offers including intermural sports, group exercise classes, nutrition classes and all of the workout space anyone could ask for.

Over the years, I have learned the importance of having an active and healthy lifestyle. College, especially, has shown me that without a balance of exercise and nutrition everything from my physical well-being to my mental, emotional, and spiritual well-being works ten times harder to stay on track with a healthy state of mind. I've seen how quick of a positive turn around my whole state of mind and individual well-being can have just from staying active and eating right. I have a far greater tendency to be happier, think better, make better decisions, and seek to be healthy in many other ways when I am consistently physically active than when I am not.

Having spent the past summer in Bozeman, MT has shown me what an active community looks like and the benefits that come as a result of "healthy" and active lifestyles. During the months of June and July of 2014, I lived in the Bozeman community as part of a design/build program. I enjoyed the several opportunities I had to get out and be active. I had several options for active entertainment that ranged from hiking, mountain biking, several walking paths, going to the farmers market, or downtown to the weekly street fair. There was always something to do and a new adventure to find. I noticed that a majority of the community had fully embraced the choice to be active, eat healthy, recycle, renew, and be "green." Much of the population was not only interested in being physically active, but they were great at socializing with one another, eating natural foods, and choosing to "go green" by purchasing local foods, recycling, biking/walking to work as much as possible, and several other positive aspects.

NARRATIVE (CONT)

I don't believe that great communities such as Bozeman are rare/scarce; or are only possible in select geographical locations. There is so much more to healthy communities than just the landscape. Fargo, ND is another great example of an active community, and it does not have the landscape advantage that Bozeman, MT does. Fargo has done well in getting the community to be active by providing run/walk events throughout the year, many walking paths, and biking lanes all across town. Every town in America, and even around the world, has the opportunity to be more active, promote healthier choices, and influence a more positive lifestyle, attitude, and a stronger generation in turn. My hopes in designing for a more active lifestyle in communities is not to make the town better, but first focus on the individuals of the town and how to enrich their lives to help them be healthy physically, mentally, and spiritually.

Taking the lessons I have learned through my own experience, I want to implement them into cities across the nation where there is such a lack in active living and healthy community lifestyle. Living in Dickinson, ND with no wellness center for the longest time has shown me the desperate need communities have for some form of a community building that provides more than just a *space* to host activities; but more so a *place* with a variety of activities. Getting into college and going through the ups and downs of finding a consistent workout schedule due to school has proven the need for physical activity as part of a positive benefit for mind, body, and soul. Having the opportunity to work out and be a part of the NDSU Wellness Center in Fargo is a great example of what good architecture and great building programming can do. Finally, living in Bozeman, MT has shown me what active living can look like on a more urban scale with a more natural environment.

The setting for this thesis takes place in a community in the heart of a poverty stricken area due to a lack in nutrition, increased obesity and diabetes, unemployment, alcohol abuse, high rates of suicide, low life expectancy rates (*A Pine Ridge Story)*. This past summer my sister chose to live on an Indian reservation and help the Lakota Sioux Indians in Rosebud, SD near the Pine Ridge Indian Reservation. She told me several times about the brokenness she saw in the community and the problems she encountered on a daily basis. After visiting the area, I saw firsthand what she had been talking about. The Dakota Boys and Girls Club that she had been working with have been doing their best to turn the community around by providing a positive outlet for the youth of the area. They have done an excellent job; but are extremely limited in resources and places to meet the needs of the area.

This thesis seeks to not only provide a place for active living; but bring about a change within the community of the Rosebud reservation. Providing a place for various activities doesn't solve all the problems and hardships members of the community have or are going through; but it can spark a new way of life and bring about hope. Active living isn't just about losing weight and looking good, it is about changing the way we look at life by inspiring individuals to do better, think differently, and hopefully be happier as an individual and as a community.

PROJECT TYPOLOGY

INTERACTIVE WELLNESS CENTER

CLAIM:

Creating a place that provides members of the community with an outlet for physical activity, academic and spiritual growth, and provide programs for furthering education on healthy choices and lifestyle. This will in turn enhance the physical and mental condition within individuals and members of the community as a whole.

SUPPORTING PREMISE:

There is an immeasurable amount of design elements that can be used to encourage active lifestyles in the built environment. Examples of which include: bike paths on roadways, walking/running paths, hiking trails, and wellness centers. The landscape varies from one place to another; therefore not every active design element can be implemented in the same way. Several factors need to be taken into account in order to proceed forward with the best design solution for a community. Weather can be a major factor in several areas where climates do not always provide the best conditions for outdoor activities. Providing a covered structure as a place for physical activity and active living tackles several issues that urban design can not overtake; as well as provide a place for all members of the community to come together.

FIRSTENBURG COMMUNITY CENTER - VANCOUVER,WA

FIGURE 2.0 - Firstenburg Community Center Front Entrance Img

FIRSTENBURG COMMUNITY CENTER - VANCOUVER, WA

Project type: Community Center

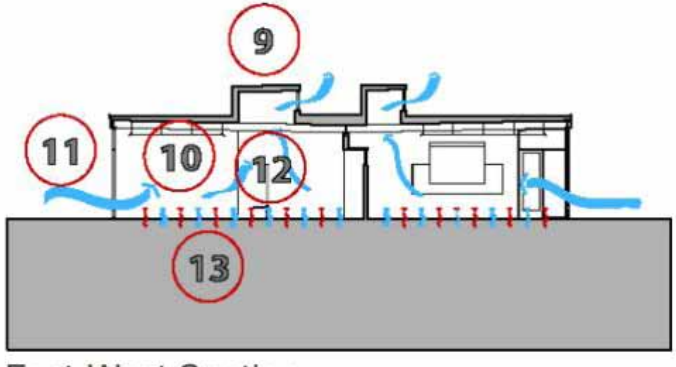
Location: Vancouver, Washington

Architect: Opsis Architects

Size: 80,982 sf

FIGURE 2.1 - Firstenburg Community Center Site Plan

North-South Section



East-West Section

Daylight and Ventilation Features

1 North Facing Daylight Glazing
2 North Facing Air Intake
3 Radiant Heated Slab
4 Daylight and Stack Ventilation Monitor
5 Clear Glazing to Natatorium
6 South Facing Daylight Monitor
7 South Facing Wood Sunshade
8 Pool Filter Backwash System Tank
9 Relief Air / Daylight Monitor
10 Indirect Lighting with Daylighting Control
11 Operable Windows and Trickle Vents
12 Screen and Bench of Milled Site Trees
13 Radiant Heated and Chilled Slab

figure 2.2 - Firstenburg Community Center Elevations Diagram

FIRSTENBURG COMMUNITY CENTER - VANCOUVER, WA

The Firstenburg Community Center is a LEED Gold Certified multi-use facility. The design integrates the site and community necessities well by using the land resources and natural systems for building material and energy use. The building program is extensive and provides a variety of activities for the community spread for all ages to use.

figure 2.3 - Firstenburg Community Center Back View

figure 2.4 - Firstenburg Community Center Floor Plan 1

figure 2.5 - Firstenburg Community Center Floor Plan 2

PROGRAM

1. Community Room
2. Game Room
3. Juice Bar
4. Pool
5. Locker Room
6. Rock Climbing
7. Gym
8. Administration
9. Mechanical
10. Track
11. Fitness

FIRSTENBURG COMMUNITY CENTER - VANCOUVER, WA

figure 2.7 - Firstenburg Community Center Track

figure 2.8 - Firstenburg Community Center Pool

figure 2.9 - Firstenburg Community Center Meeting Room

KEY ASPECTS

This community center excels at reducing building footprint, re-use of building materials, reducing water and energy usage. The design not only succeeded at providing a more sustainable and effective community activity space; but also promotes community acitivty throughout the city and promotes sustainable design. Key aspects to take away from this case study is the site integration, building program, and sustainable design ideas.

figure 2.6 - Firstenburg Community Center Exterior View

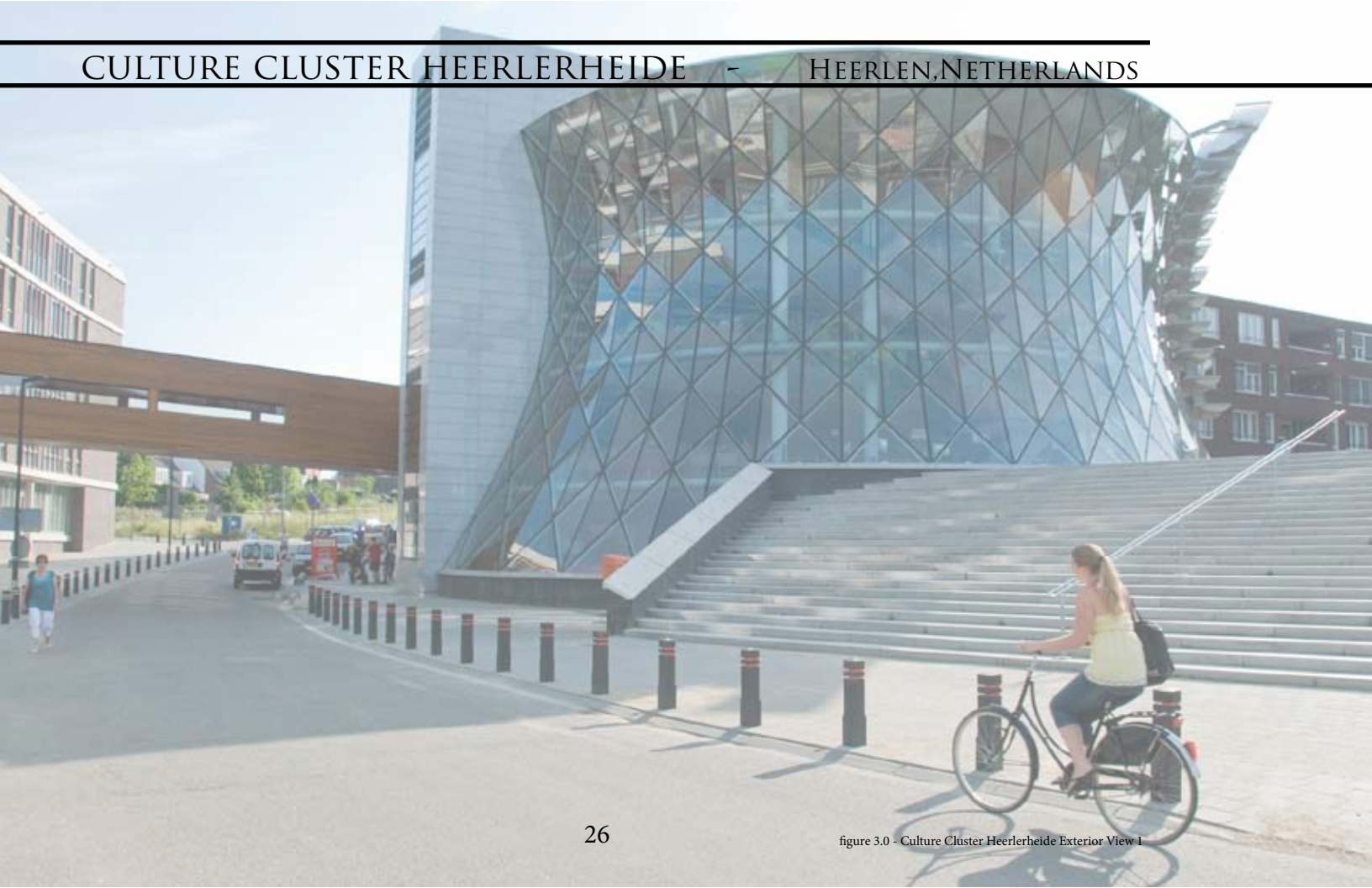


figure 3.0 - Culture Cluster Heerlerheide Exterior View 1

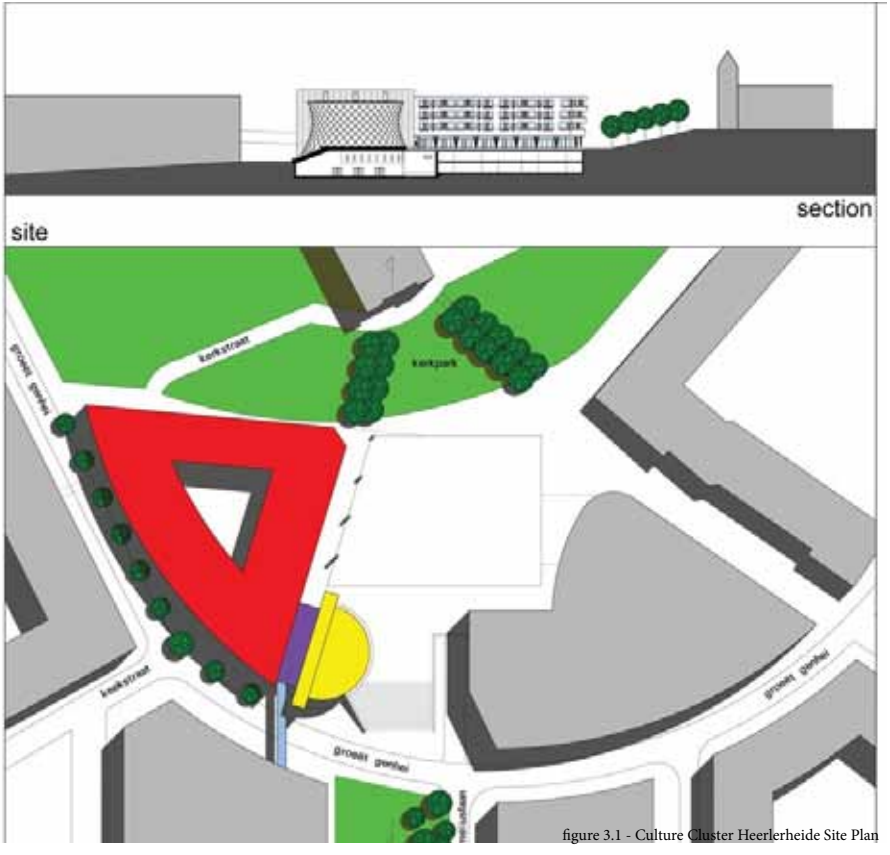


figure 3.1 - Culture Cluster Heerlerheide Site Plan

Project type:
Community Center

Location:
Heerlen, Netherlands

Architect:
Wauben Architects

Constructed:
January 2008

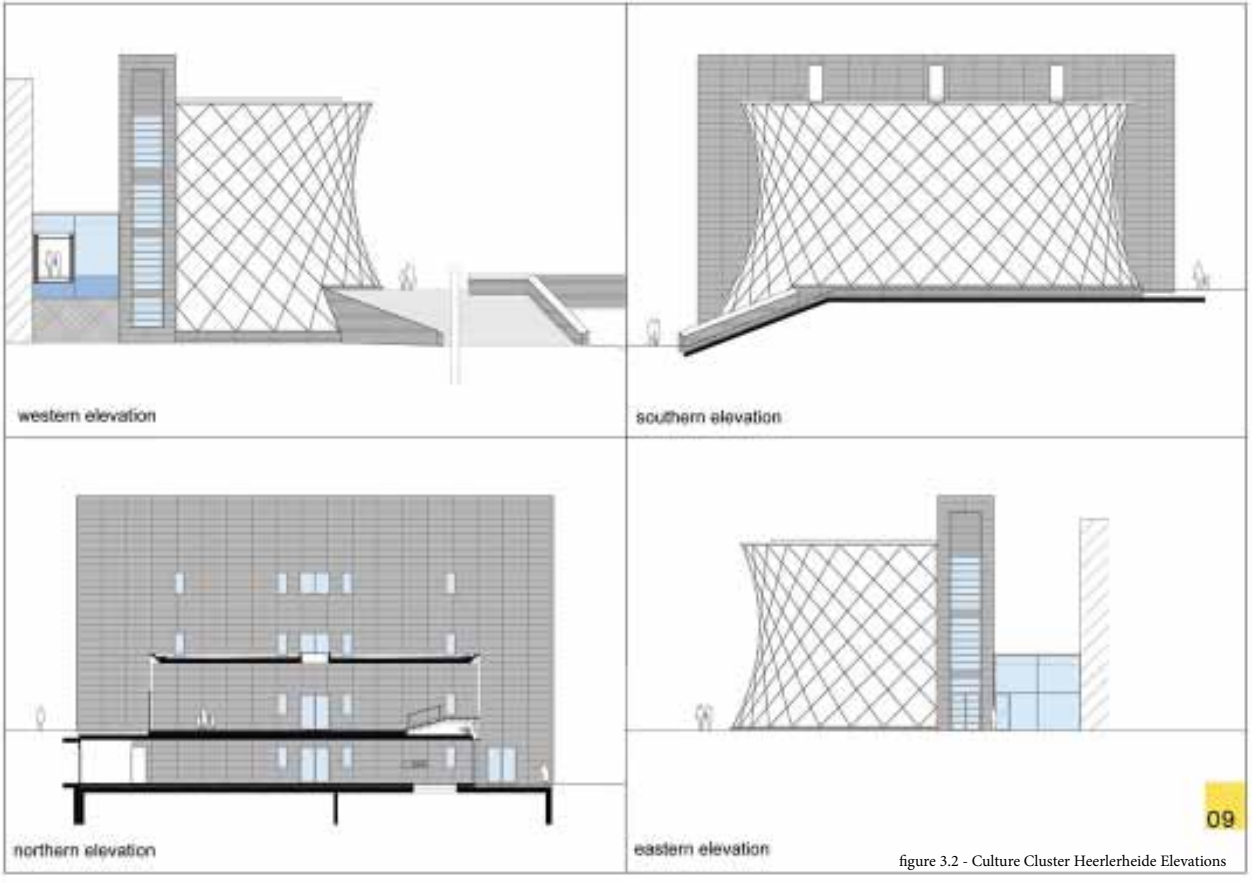


figure 3.2 - Culture Cluster Heerlerheide Elevations

CULTURE CLUSTER HEERLERHEIDE - HEERLEN,NETHERLANDS

Culture Cluster Heerlerheide is a multi-facilitated building with several purposes. The design goal was to revitalize an old and "deteriorating" mining town in the Netherlands. This building didn't only bring in a center for the community, but also an elementary school, care-facility, 2 supermarkets, retail, fitness center, and 500 dwellings.
The structure uses hi-tech engineering to utilize geothermal energy to heat and cool the building. The double glass facade acts as a solar screen guard during hot summer months while heating the air during cooler months. The circular glass facade of the structure also works as a cooling tower. The building is the first in the world to use the water from the old coal mines that is pumped throughout the structure to heat and cool the spaces.

Interesting Features:

Glass Cooling Tower
- Theatre
- Conference centre
- Café
- Library

Triangular Brick Building
- Public parking
- Supermarket
- Retail
- Residential units

figure 3.3 - Culture Cluster Heerlerheide Exterior View 2

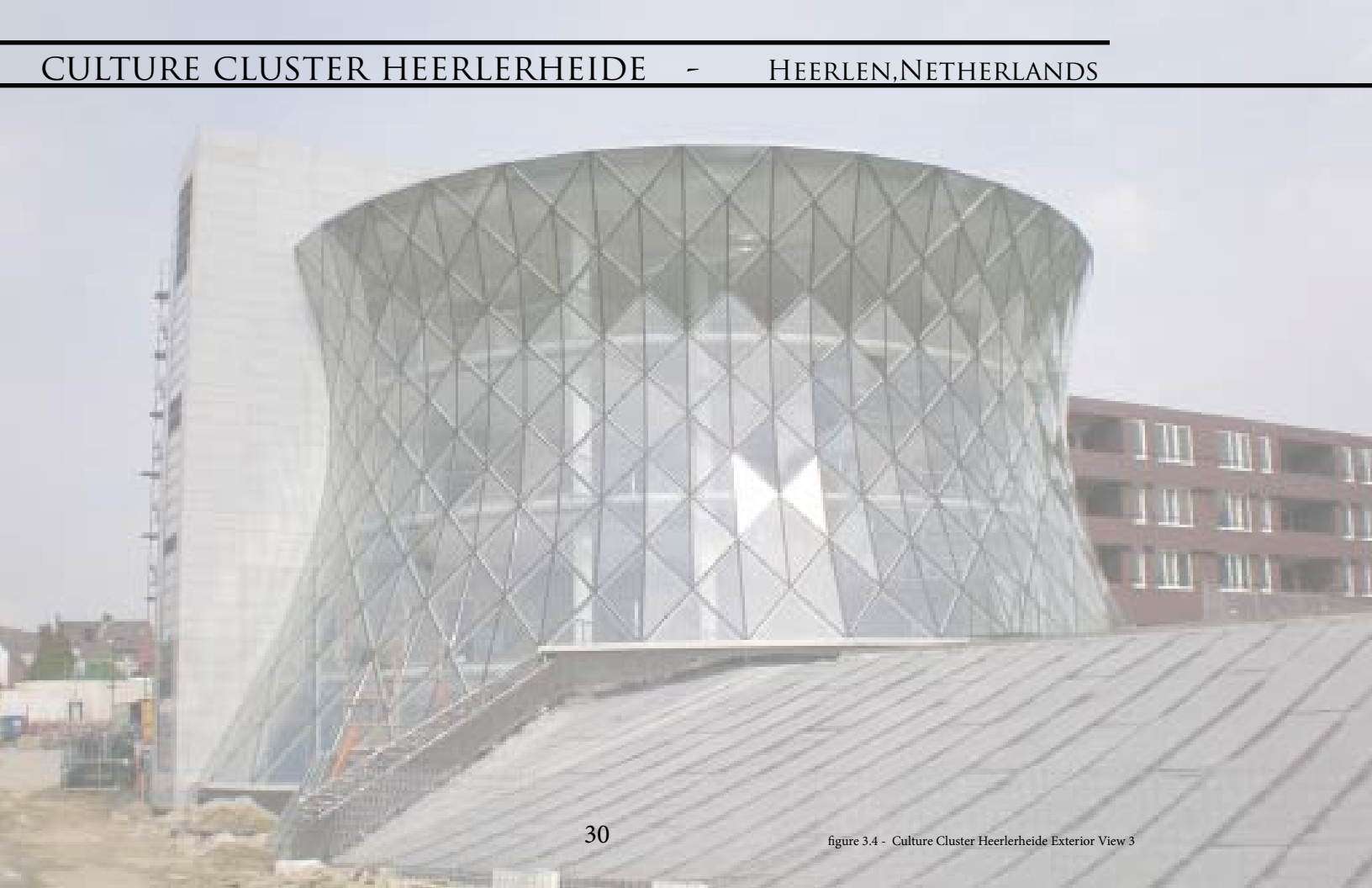


figure 3.4 - Culture Cluster Heerlerheide Exterior View 3

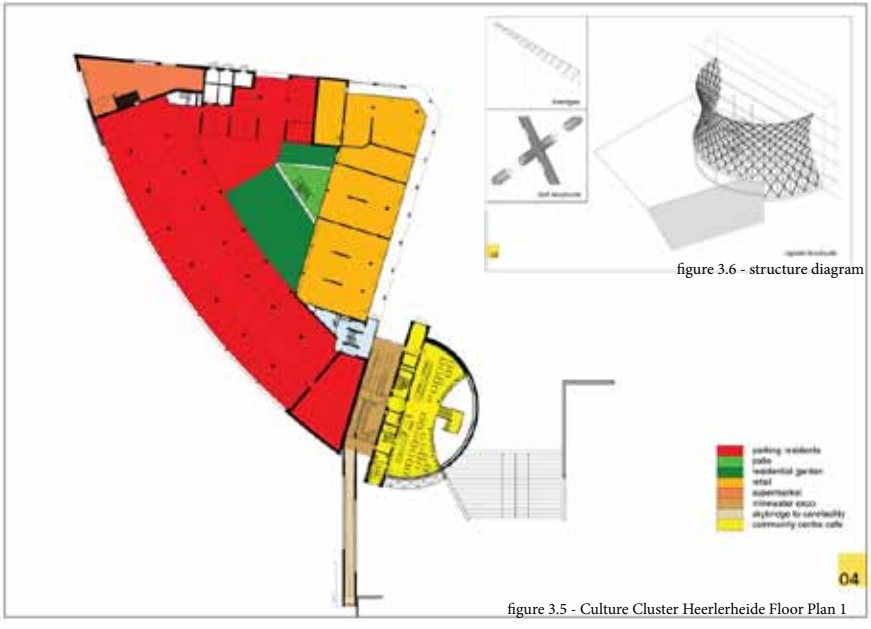


figure 3.5 - Culture Cluster Heerlerheide Floor Plan 1

figure 3.6 - structure diagram

figure 3.7 - exterior rendering 1

figure 3.8 - exterior rendering 2

KEY ASPECTS

In relation to the thesis project, the Culture Cluster is a prime example of the many amenities an activities building can have. The site for the building is in a similarly rural setting as is the thesis project. Key features to take away from this project is the multiple uses the building has, the structural elements of the glass facade and excellent use of geothermal energy.

figure 4.0 - Student Activity Center Exterior View 2

figure 4.1 - Student Activity Center Interior View 1

Project type:
Youth Activity Center

Location:
Bangkok, Thailand

Architect:
Supermachine Studio

figure 4.2 - Student Activity Center Interior View 2

STUDENT ACTIVITY CENTER - BANGKOK, THAILAND

This Student Activity Center (SAC) is an addition to the Bangkok University dormitory. The facility includes photo studios, music rehearsal rooms, dance rooms, faculty and meeting rooms. The structure extends on top of the pre-existing 90 m long building and ends with a new structure at the end of the building that serves as a training ground for the cheer leading team.

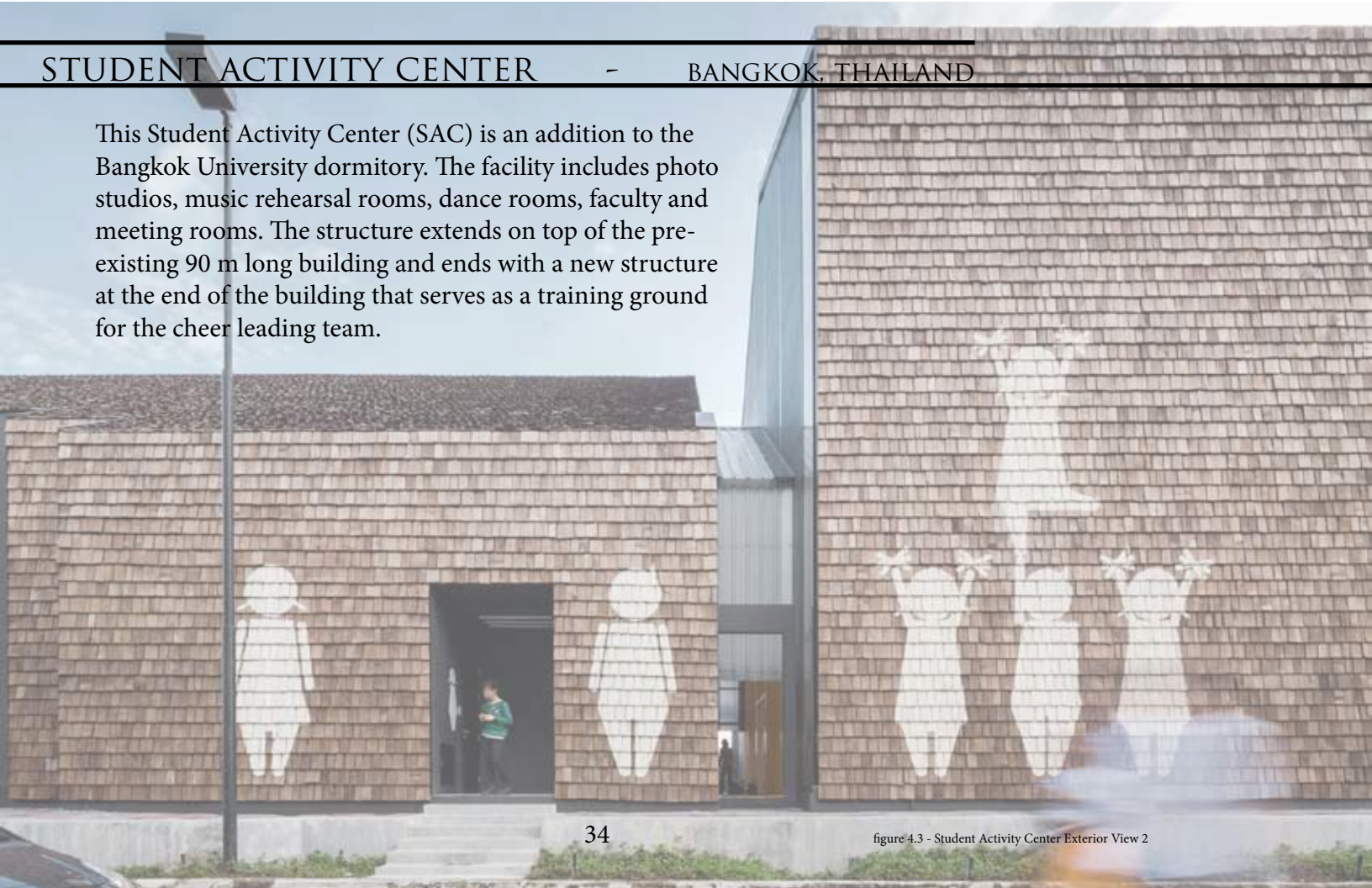
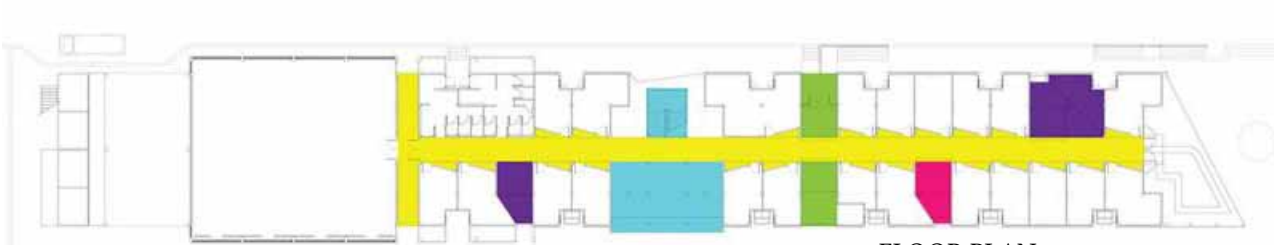


figure 4.3 - Student Activity Center Exterior View 2



FLOOR PLAN

figure 4.4 - floor plan Student Activity Center

INTERIOR ISOMETRIC

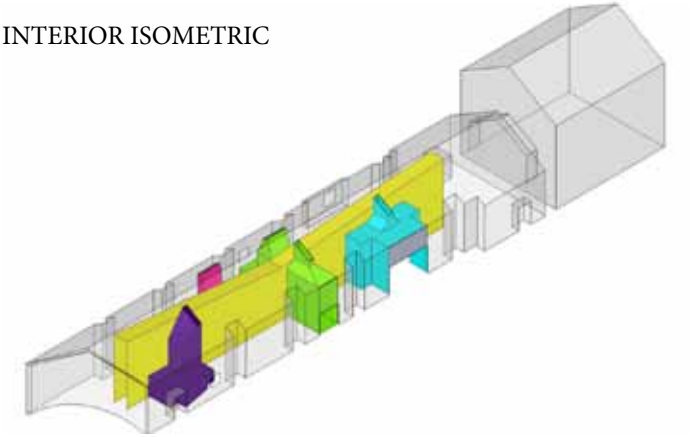


figure 4.5 - interior isometric

KEY ASPECTS

This project is very unique in it's programming and building spaces. The layout stretches along 2200 sq m of a rectangularly formed building. The rooms are extremely diverse to accommodate for so many different performing arts spaces.

Key features of this project in relation to the thesis are the colorful rooms. A suggestion one of the children on the Rosebud Reservation had given for activities to do is a "colored forest." The colored rooms with trampolines and lounge spaces are a new way to accommodate for this request.

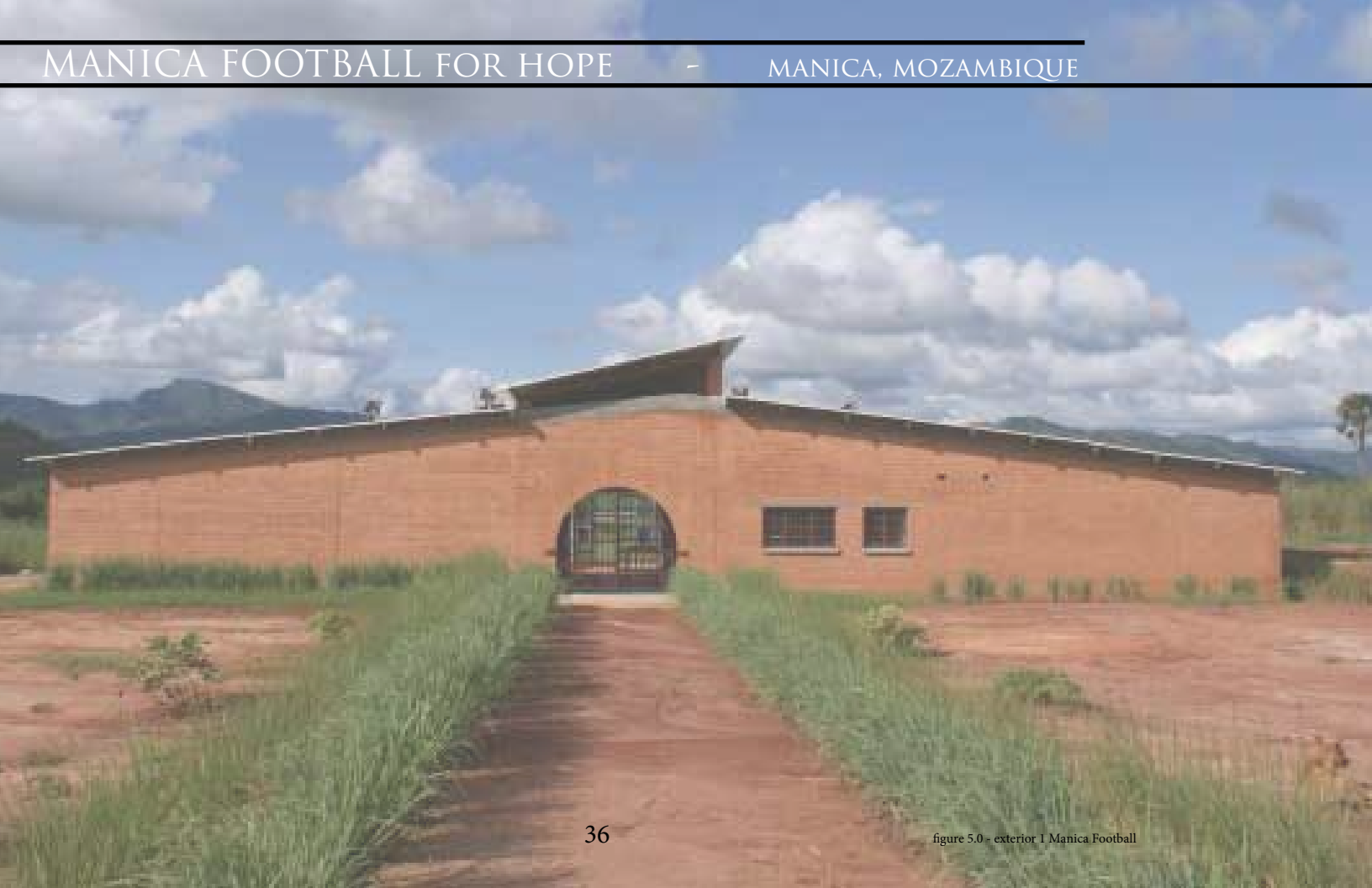


figure 5.0 - exterior 1 Manica Football

Project type:
Youth Center/Sports Facility

Location:
Manica, Mozambique

Architect:
Jose Forjaz arquitectos
Architecture for Humanity

Constructed:
August 2011

Built with a mission to bring back hope and dreams to the community of Manica through social cohesion, this structure provides an outlet for community social gatherings and physical activites. Designers chose to use local materials and requested local community members to help with construction to bring about a sense of pride and ownership of the structure. The space provides a soccer field for locals to use, a computer room, classroom for health, wellness, and learning programs.

figure 5.1 - exterior 2 Manica Football

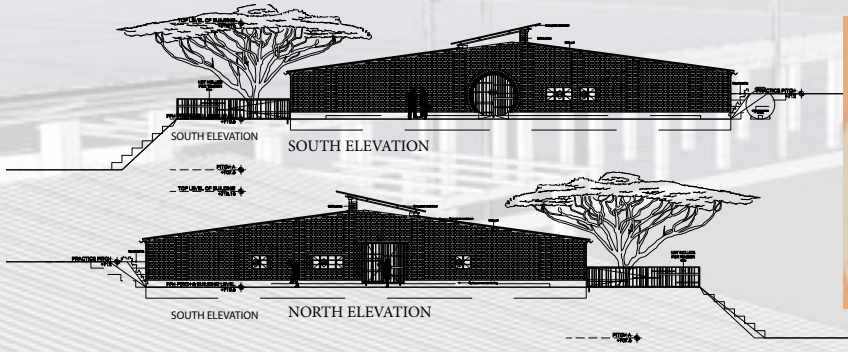


figure 5.2 - interior 1 Manica Football

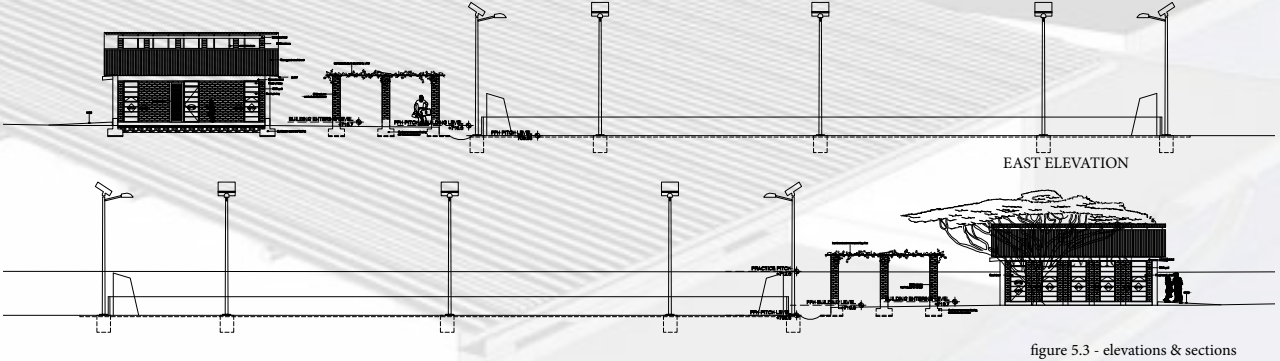


figure 5.3 - elevations & sections

figure 5.4 - exterior rendering Manica Football

KEY ASPECTS

Though the site of this structure takes place across the world from the Rosebud reservation in SD, the typology of the community is very similar. Both communities face hard circumstances with poverty and violent crime in their surroundings. The approach Architecture for Humanity is a great setting for steps that should be taken in building for the Indian reservation by use of local materials and local participation to get the community involved and provide them with a chance to take ownership.

FLOOR PLAN

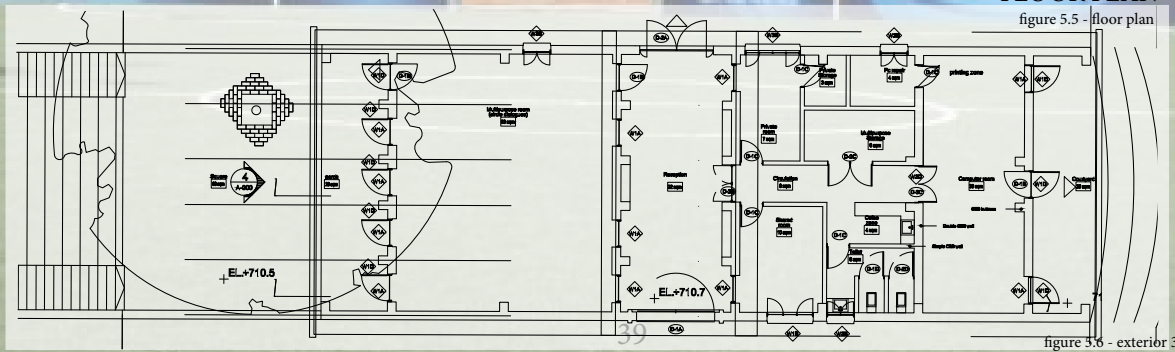


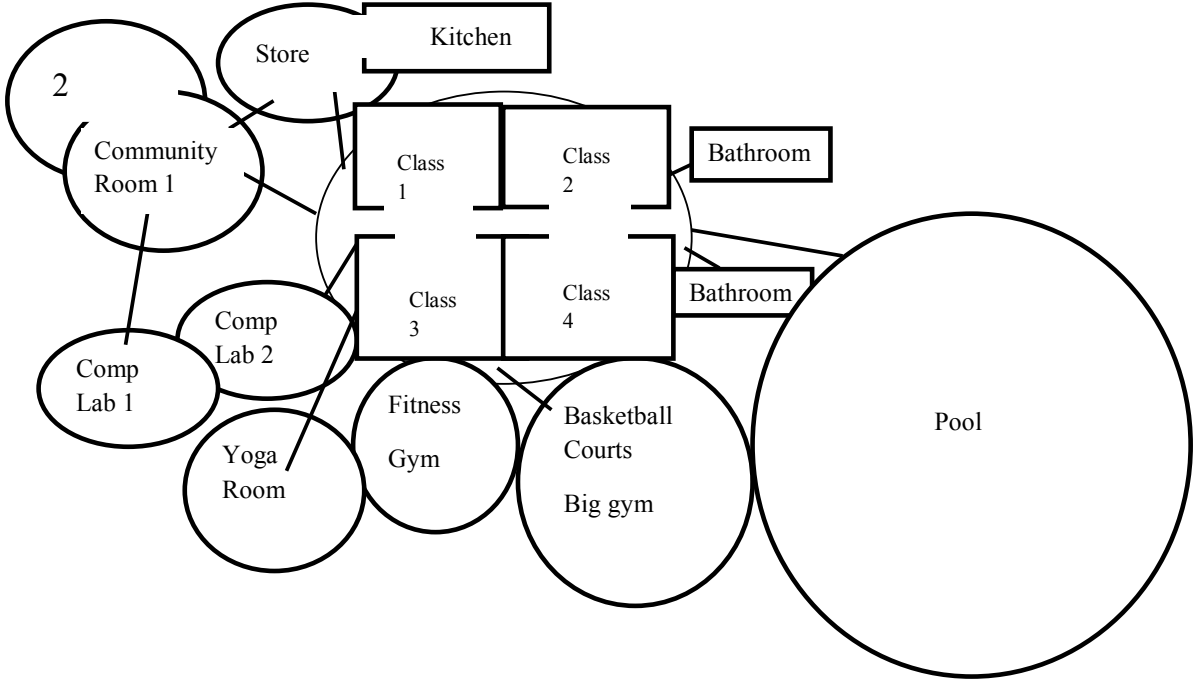
figure 5.5 - floor plan

figure 5.6 - exterior 3 Manica Football

MAJOR PROJECT ELEMENTS

PUBLIC	Community Rooms Basketball Court Pool Fitness gym Yoga room Homegoods store
PRIVATE	Classrooms Hands-on learning labs Art Room Kitchen
OUTDOOR SPACE	Green roof Basketball court Soccer field Walking path Community gardens Skate park

Indoor Space Layout
Active Living and Learning
Community Wellness Center



USER/CLIENT DESCRIPTION

The typology of this thesis is designed to meet the needs of varying age groups within the Dickinson community with the emphasis being on the younger generation. The activities of the building program are designed to give activities for young children; but it is not restricted to that age. There will be plenty of other spaces open for the community of all ages to use.

OWNER

City of Dickinson

The facility will be fully supported by the City of Dickinson. Owner management will belong to the local residents. Therefore all managerial staff will be hired locally.

USER GROUPS

YOUTH
- Ages range from infant to pre-teen
- Programming requirements for this age will include child care provision, facilitated activity programs, child crafts, and secured play rooms
- Facility requirements for this age include child protection locks on doors, sizeable rest rooms, lower drinking fountains, nursery/diaper changing room, and childcare

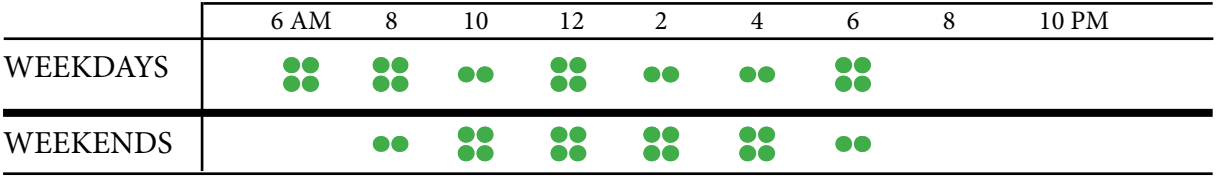
YOUNG ADULT
- Ages range from 13-18
- Programming requirements include active game rooms, enhanced learning centers, limited access to computer lab, limited access to exercise equipment and kitchen, locker room space, changing room

USER GROUPS

ADULT
- Ages range from 18 and up
- Programming requirements include activity rooms accessible for any classes, crafting and cooking space, free access to all building facilities, cafe, shop, locker room space, changing rooms, parking

SPECIAL NEEDS
- Anyone with physical disability
- Programming requirements include meeting ADA for wheelchair accessibility, hand rails, braille signs, special exercise equipment, handicap parking

PEAK TIMES OF USE



SITE INFO - MACRO

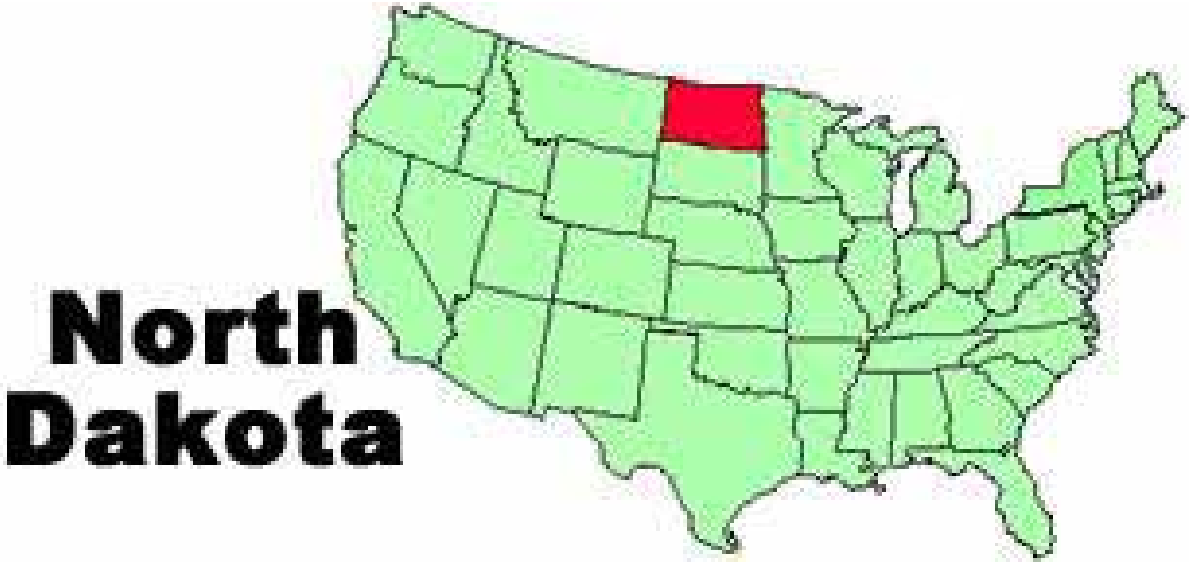


figure 6.0 - Map of United States

REGION

Dickinson, ND is located in the south west region of North Dakota, ninety miles west of the state capitol in Bismarck, ND.

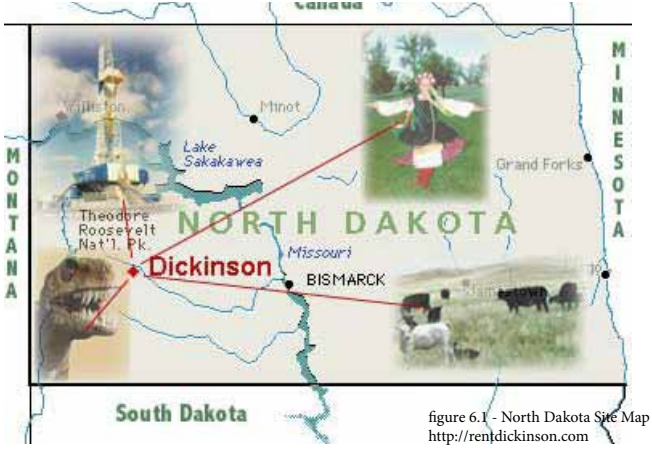


figure 6.1 - North Dakota Site Map
http://rentdickinson.com

CITY: DICKINSON, ND

COUNTY: STARK

POPULATION: 20,826 (2013)

Locally known as the Queen City, Dickinson was established in 1906 as a pitstop location for the railroad along route to Montana. Dickinson has been making headway even more as one of the major boomtowns in North Dakota with the most recent oil boom in the western region. Majority of Dickinson is farm country. The surrounding area is flourishing for local farmers

Downtown Businesses

figure 6.3 - Site - Downtown Img 1

Jordheims Plaza Building

figure 6..4 - Site - Downtown Img 2

Train Depot

figure 6.5 - Site - Downtown Img 3

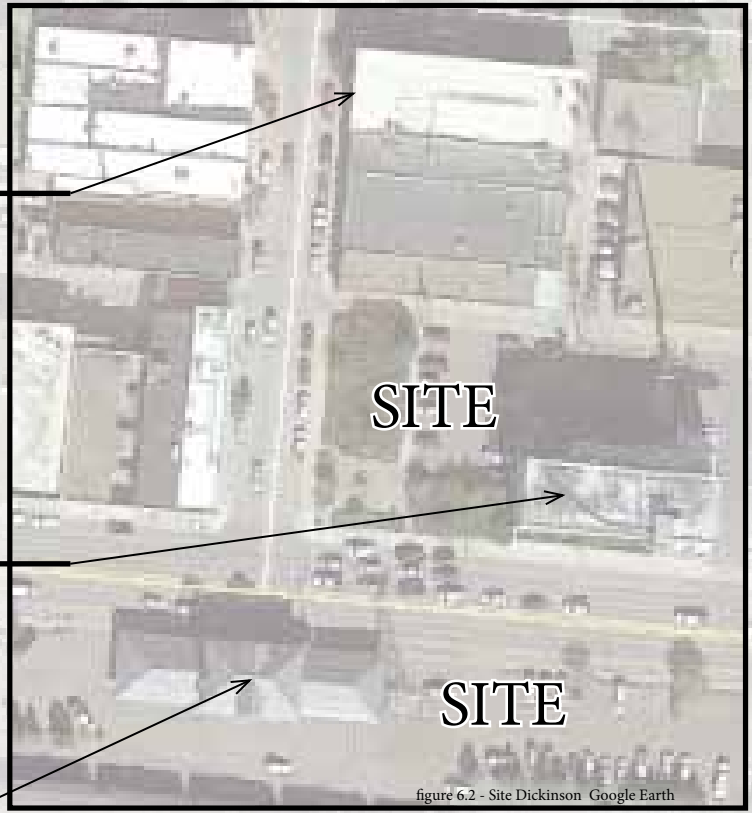
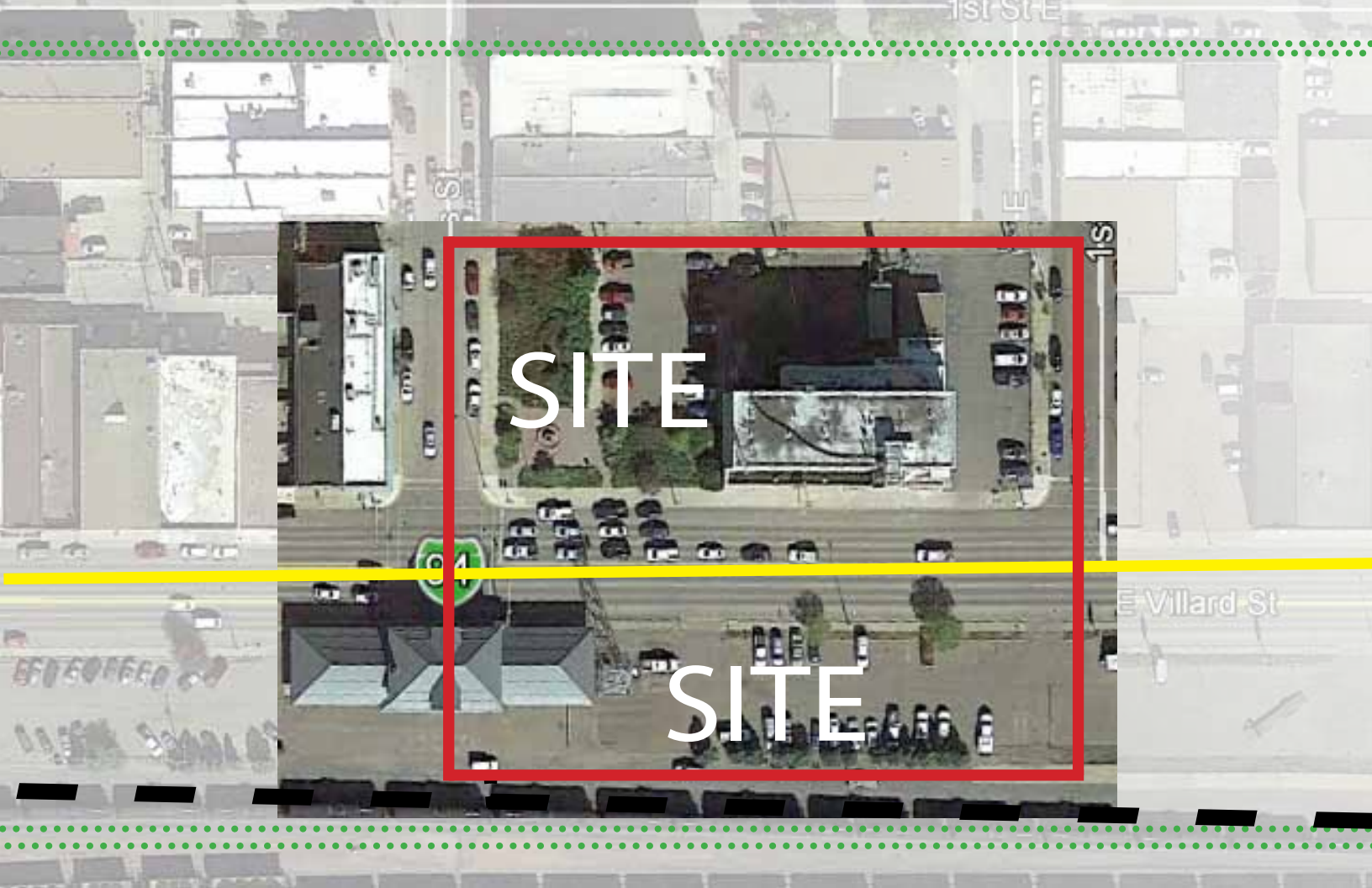


figure 6.2 - Site Dickinson Google Earth

SITE ADDRESS	8 East Villard St Dickinson, ND 58601
AREA	160 acres
IMPORTANCE OF SITE	Location is key. The site chosen for the activity center is due to a few key factors. 1) Located at the heart of downtown Dickinson. I feel it is of great importance to have the activity center located in downtown area in order to increase business and traffic to local downtown buisnesses and bring about more entertainment for this area. 2) Opportunity to refurbish a historic building that is located on site 3) A city plaza already exists here

figure 6.6 - site Google Earth


SITE
SITE
94
E Villard St

SITE INFO - MICRO

1 - LOOKING WEST TOWARDS BUSINESSES
figure 6.8 - site looking west

2- LOOKING NORTH FROM RAILROAD TRACKS
figure 6.9 - site looking north

3 - LOOKING EAST TOWARDS JORDHEIMS PLAZA
figure 6.10 - site looking east

4- LOOKING SOUTH TOWARDS TRAIN DEPOT
figure 6.11 - site looking south

PROJECT EMPHASIS

This thesis seeks to fully engage memebers of the community in becoming active and helping to better their lives individually and as a community. The focus of this thesis is to provide a space for many variations of activity that promote a healthier lifestyle.

There are several different design elements that can be used in order to implement a healthier, more active, lifestyle within the community and therefore better the community. In order to be successful in promoting active living, one needs to provide a variety of options for more active living.

This thesis will only focus on a few design elements used for active living, but leave room for more design ideas to be implemented down the road. The focus of this thesis is to provide a single structure that contains several forms of activity within the structure. The emphasis of this project is on providing an outlet for physical activity, youth programs, community spaces, and in advancing awareness of health for the community.

GOALS OF THESIS PROJECT

FOR PROJECT ITSELF

- Raise an awareness on the direct correlation the built environment has on the communities interaction with one another, their physi cal well-being, and the sustainability of the community
- Better the physical well-being of individuals within the community
- Drop obesity and diabetic rates
- Better the well-being of the community to be more interactive with one another and with the environment
- Decrease amount of crime, violence, teen drinking, and suicidal rates on the Rosebud reservation and surrounding areas
- Bring back the sense of pride for the Lakota Sioux Indians
- Start a movement for more sustainable choices within the community
  - Green design
  - Local resources
  - Grow their own food
  - Recycle

GOALS OF THESIS PROJECT

ACADEMIC

Being in the architecture program at North Dakota State University has pushed me far beyond anything I had expected to accomplish. I am so thankful for all that I have learned and how much I have grown in the past four years of school. My goals for my final year in the architecture program is to push myself even more than before and take advantage of every opportunity that I can. I want to finish my final year strong, with no regrets in all aspects. I am looking to challenge myself even more and learn all that I can while working on my thesis project, in order to be fully prepared for life and a professional career once I graduate.

PERSONAL

One of my greatest goals in life is to help others see the world differently. I strive to bring a postive attitude into everything I do, and I seek to carry that with me into the work place and community I find myself in. My long term goals for myself is to always challenge myself and never settle for less. I am continually pushing to be a better person both spiritually and mentally. I seek to always be open to new things and always learning. My goal in life is to always better myself and those around me.

PROFESSIONAL

As a professional architect I want to make a positive impact in places that are suffering from poverty or natural disasters. I am passionate about helping others and creating a positive environment for people to live in and be a part of. My long-term goals in architecture is to design simple structures in third world countries that meet the needs of the people while using local resources and enhance their quality of life.

DEFINITION OF RESEARCH DIRECTION

Research on concepts which support or cross examine the thesis premise will be conducted in a quantative and qualitatvive manner. A qualitative investigation of case studies relating to the thesis project typology, historical context, analysis of the chosen site, and requirements necessary for the thesis program will also be done to push the project forward. Data will be collected through use of local resources found in the NDSU library, as well as online services such as EBSCO, architectural articles, and other useful resources.

PLAN FOR DESIGN METHODOLOGY

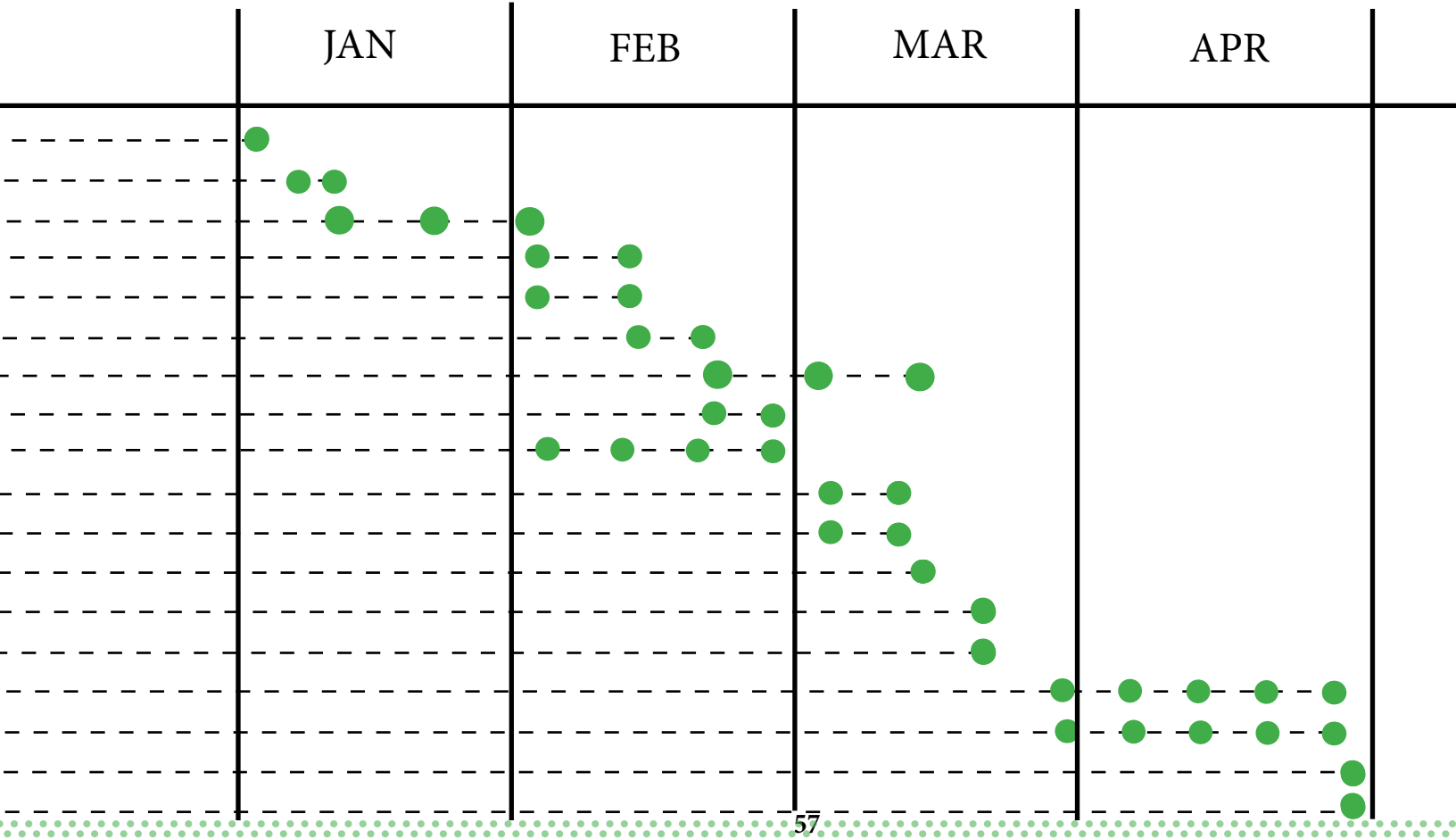
In proceeding with the thesis design, a qualitative and quantitative analysis of research done and data collected will be performed. The graph below describes the analysis process for the data collected. The interpretation of the given information will be graphically represented, hand drawn, physically modeled, as well as digitally modeled.

DOCUMENTIN DESIGN PROCESS

The outcome of the thesis is all in relation to the process it has taken in order to come to the conclusion. Therefore, documenting the design process is critical in understanding the final result of the design. The design process for the thesis will be documented weekly throughout the semester. Documentation of the design process will be done through weekly submittals of digital work, scans of hand drawings, and pictures taken of any physical modeling. All process work will be collected and either stored throughout the semester, scanned and stored digitally, or photographed.

PROJECT TIMELINE

Days Till Final	Task	Duration	Dates
[65]	**Context Analysis**	[7]	January 14- 23
[54]	**Concept Analysis**	[10]	January 20 - 30
[49]	**Spatial Analysis**	[15]	January 26 - Feb 6
[44]	**ECS Passive Analysis**	[11]	February 2 - 13
[44]	**ECS Active Analysis**	[11]	February 2- 13
[40]	**Floor Plan Development**	[11]	February 9 - 20
[25]	**Digial Model Development**	[19]	February 17 - Mar 13
[35]	**Envelope Development**	[10]	February 17 - 27
[35]	**Materials Development**	[10]	February 7- 27
[25]	**Structural Development**	[10]	March 2 - 13
[25]	**Elevation Development**	[10]	March 2- 13
[25]	**Midterm Reviews**	[5]	March 9 - 13
[20]	**Project Revisions**	[5]	March 23 - 27
[20]	**Presentation Layout**	[5]	March 23 - 27
[7]	**Renderings**	[20]	March 30 - Apr 17
[7]	**Physical Model**	[20]	March 30 - Apr 17
[6]	**Plot**	[5]	April 20 - 24
[3]	**Prep for Presentation**	[3]	April 20 - 24


JAN
FEB
MAR
APR

PREVIOUS EXPERIENCE

SECOND YEAR

FALL 2011	RHET FISKNESS
tea house	Fargo, ND
boat house	Minneapollis,MN
SPRING 2012	JOAN VORDERBRUGGEN
montessori school	Fargo, ND
birdhouse	Fargo, ND
community dwelling	Cripple Creek, CO

During the course of my first experience with architectural studio classes I had the opportunity to explore creative design in relation to architecture and stretch my bounds of abstract creativity further than I had ever seen beyond myself.

THIRD YEAR

FALL 2012	MIKE CHRISTENSON
askanase hall theater	Fargo, ND
SPRING 2013	DAVID CRUTCHFIELD
folk art museum	Chicago, IL

In my third year of school I learned more of the technical aspects of architecture. Designing a theater space gave me insight to the broader spectrum of architecture and the detailing it takes to become an architect. Designing a museum helped inform me of how aesthetically designing systems such as HVAC a, electrical, and plumbing are crucial in designing a well -rounded space.

figure 7.1 - community dwelling 2nd yr

figure 7.0 - urban design 4th yr

PREVIOUS EXPERIENCE

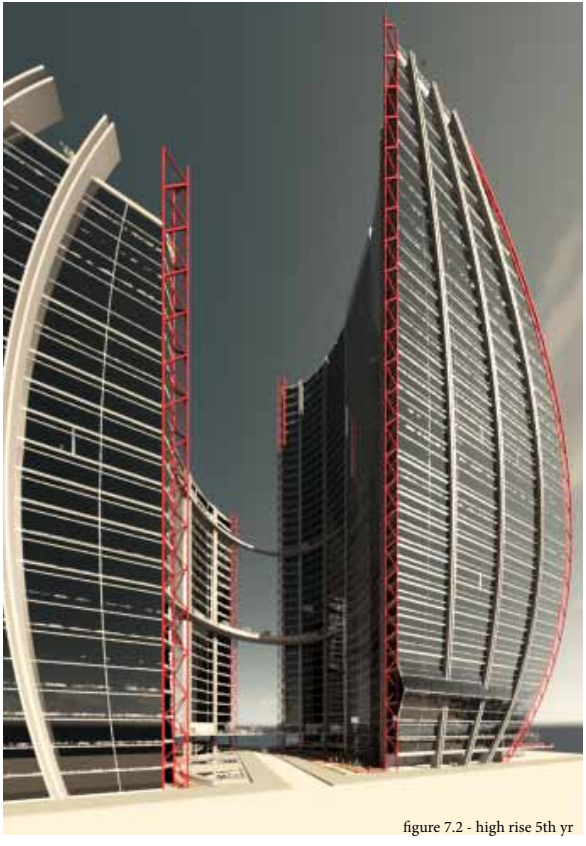


figure 7.2 - high rise 5th yr

FOURTH YEAR

FALL 2013
high rise
(capstone project)

BAKR ALY AHMED
San Francisco, CA

SPRING 2014
urban design
marvin windows competition

DON FAULKNER
Williston, ND

Working on the high rise project during my fourth year was the best way to gain insight on a glimpse of what being in a firm may look like while working with a partner. I gained a lot of experience how to design in a holistic manner of considering all aspects of architectural design.

FIFTH YEAR

FALL 2014
oilfield patch housing

MIKE CHRISTENSON
Western ND

SPRING 2015
thesis

MIKE CHRISTENSON
Dickinson, ND

The fifth and final year of my schooling has given me the chance to develop myself more as who I am as a designer. I got the opportunity to explore more of my intrestes and beging to develop a more personal way of how I design.

FIGURE REFERENCES

FIGURE REFERENCES

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PERSONAL ID

figure 7.3 - profile pic

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- “LIVE LIKE YOU WERE
  DYING’

THE PROGRAM

Thesis Premise: How does the built environment influence active lifestyle in the community and how can it be designed to increase activity and promote healthy individuals and community?

In looking at the correlation between the built environment and active living, there are numerous elements to take into account. The influence that the built environment has on urban or rural populations in becoming more physically active is very broad, and can include anything from streets and sidewalks to safety and security. Much has to be taken into account in the context of the built environment when looking at promoting a more active lifestyle for community regions. The first portion of the following summary analysis is a brief overview of how each of these factors play into a vital role for physical activity from various sources of in-depth research provided over many years. The second portion explains a more detailed description of how these factors use architectural design to greater increase physical activity, therefore bringing about a more positive and healthy community.

In the following pages you will find a variety of research findings, terms, definitions, and summary analysis seeking to find an answer towards a theoretical premise question. The thesis premise is concerned with the link the between the built environment and physical activity. In order to best assess the thesis premise thoroughly and efficiently, the premise will be divided into four parts, each containing questions within themselves that will be sought to find out:

1) Define built environment and physical activity

2) Define the relation between the built environment and physical activity

3) What ways can the built environment be designed to further encourage physical activity

4) How does physical activity better individuals and the community

DEFINING THE TERMS

In order to best understand the context of the theoretical premise, some terms must be defined. The two terms that must be fully established is "built environment" and "physical activity." The definitions for each term are as follows:

BUILT ENVIRONMENT – The built environment is any subject matter that is of physical condition and can be seen with the physical eye. Tom J. Bartuska defines "built environment" as follows: **"The built environment is everything humanly made, arranged, or maintained to fulfill human purposes…"** (Bartuska, 1994). Simply put, the built environment is anything built by human terms; therefore, any part of the physical environment separate from nature. The built environment consists not only of buildings, but any structure, streets, roads, highways, sidewalks, vehicles, material objects, parks…that are within the physical world. Bartuska divides the built environment into seven different components consisting of the following: products, interiors, structures, landscapes, cities, regions, and earth.

PHYSICAL ACTIVITY – Being physically active consists of physical movement of the human body exerted at any point in time. Physical activity is different from exercise in that exercise pertains to a designated time of over excursion on the physical body with the intention of fitness for the body (Physical Activity, n.d). The European Food Information Council (EUFIC) defines physical activity as that in which **"All bodily movements that result in energy expenditure. This includes daily routine activities such as household jobs, shopping, work" (Edwards, 2006).** On the other hand, exercise is defined as that of **"Planned and structured repetitive movements designed specifically to improve fitness and health" (Edwards, 2006).** The World Health Organization describes physical activity as: **"…any bodily movement produced by skeletal muscles that requires energy expenditure. Physical inactivity has been identified as the fourth leading risk factor for global mortality causing an estimated 3.2 million deaths globally" (Physical Activity, n.d.).**

THE IMPORTANCE OF PHYSICAL ACTIVITY

In order to fully comprehend the importance of a physically active lifestyle within a community and why it is crucial to know the effects the built environment has on it, we first need to establish the benefactors of physical. It is no secret that being physically active can have positive effects on individuals, and there is no doubt that physical activity is good for any individual. Across all ages, from young to old, each and every human being should be physically active in some way. The results of an active lifestyle are staggering in preventing some of the worst health diseases caused by obesity and laziness. Table demonstrates a list of surmounting benefactors for physical activity (Does the Built Environment Influence Physical Activity, 2005).

Physical activity is wrongly presumed by several people as strenuous exercise requiring time and an incredible amount of energy. This wrong presumption of being physically active has led to so many people becoming very inactive. Simply put, physical activity is any movement exerted on the body at any time. Being physically active does not require extensive amounts of energy or time, it can be as simple as carrying laundry loads to the washer or walking to work. This is where the built environment comes in to play a vital role in stimulating the movement to become more active.

BOX 2-1 SOURCES: DHHS 1996; DHHS 2002.

Health Benefits of Regular Physical Activity

- Reduces the risk of dying prematurely from cardiovascular diseases, such as coronary heart disease and stroke.
- Reduces the risk of developing non-insulin-dependent diabetes.
- Reduces the risk of developing high blood pressure or hypertension.
- Reduces blood pressure in those already with hypertension.
- Reduces the risk of developing colon cancer.
- Reduces the risk of developing breast cancer (Vainio and Bianchini 2002).
- Reduces the development of osteoarthritis and osteoporosis.
- Reduces fall-related injuries among older adults.
- Helps maintain a healthy weight and reduce overweight and obesity.
- Helps build and maintain healthy bones, muscles, and joints.
- Reduces feelings of depression and anxiety and promotes physiological well-being.

figure 8 .0 - Physical Activity Benefits (Does the Built Environment Influence Physical Activity, 2005)

CORRELATION OF BUILT ENVIRONMENT AND PHYSICAL ACTIVITY

As mentioned before, several aspects of the built environment are factored in to the role it plays within an active community. The built environment entails a wide variety in range and length across a substantial spectrum of physical substance. In order to narrow down the spectrum further to greater define the needed assessments for best results, the built environment will be narrowed even more to focus on ***regional area, neighborhoods,*** and ***building program***. Regional focus includes anything within an urban or rural setting layout of the spatial context. Neighborhoods include density and diversity of structure within the close-nit neighborhoods, as well as sidewalks and roadways. Built structures focus more on building design in an architectural perspective of design elements provided within a built structure that provide more opportunities for exercise. Elements for each of these categories will be assessed in the following paragraphs.

1 – *Regional Area* - The first element of built environment assessed in the influence of active community is the region itself. The local region provide means and methods for physical activity in any person's day to day life. One of the most common day to day methods of physical activity possible is through transportation. Methods of transportation from one destination to the next is a major key aspect for physical activity within the built environment because it is an outlet for exercise in any individual's daily routine. Individuals can get daily exercise by choosing to either walk or bike to work, school, the store…rather than driving. The built environment can be designed in such a way as to promote biking or walking over the use of automobiles.

The layout of buildings within the community and proximity with one another plays a vital role in accommodating for physical activity. In an urban setting, communities with buildings in close proximity greatly encourage the chance for those within the community to either bike or walk from one destination to the other. When the urban setting is sprawled out further than the average five to ten minute walking radius, people are far less likely to be willing to bike or walk to their destination, with one of the major factors being the amount of time consumed. This becomes even more of a challenge in rural settings where the layout of destinations are even farther away from one another.

To further breakdown the element of regional design, it can be subcategorized into the "land use mix" of the area, as well as the density of the given area. Land use mix is categorized as**: "the relative proximity of different land uses within a given area. A mixed-use neighborhood would include not just homes but also stores, offices, parks, and perhaps other land uses" (Handy, 2002)**. Mixture of land use brings a great amount of diversity into an area, providing more opportunity for walking or biking to a destination within close proximity. The following table shows the relation between an extremely disconnected urban layout verses a well-connected mixed-use of land in the built environment context. Also notice the density of the more connected urban layout. One of the leading discouragements against physical fitness is urban sprawl (Edwards, 2006). Urban sprawl de-centralizes communities and spreads the density of buildings towards the outskirts of town; therefore, disabling the possibility of physical activity by means of transportation for people even more.

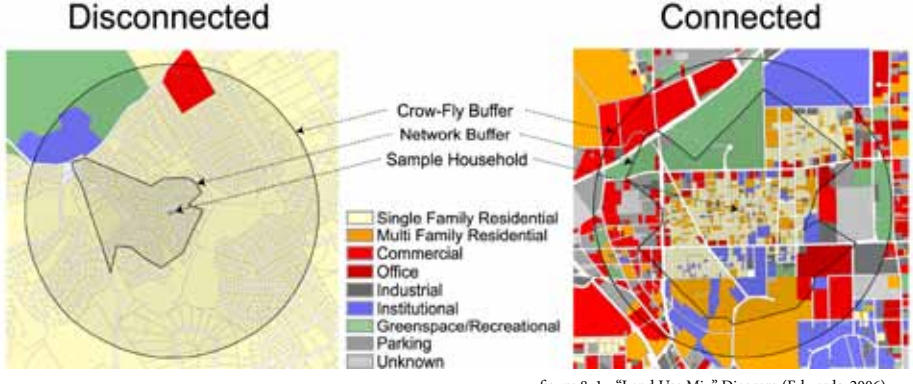


figure 8 .1 - "Land Use Mix" Diagram (Edwards, 2006)

Whether in an urban or rural setting, any way that the built environment can be designed to encourage those of the community to commute from one place to the next by use of physical activity advances the meaning of an active lifestyle. Through mixed-use community and higher density within regions, physical activity becomes a stronger possibility as a means of transportation for members of the community.

2 – *Neighborhoods* – Narrowing the region down even more, the built environment is broken down into the local region. Neighborhoods may consist of residential housing, schools, businesses, parks…all within walking distance from one another. A "walkable neighborhood" is defined in an article titled, *Health and the Built Environment,* as: **"one where residents can walk or bicycle for short trips (these are often errand or social trips, such as trips to the bank or to a restaurant)" (Handy, 2002).** Neighborhoods provide the biggest sense of community within a region. The architectural design of neighborhoods have a direct correlation with physical activity within the community, as well as how to better individuals and the community overall. Mixed-use spaces within the "walkable neighborhood" provide the opportunity for residents to walk/bike to destinations in a short amount of time. These mixed-use spaces should include some, if not all, of the following: school, church, office buildings, convenience stores, fitness gym, and outdoor park (Handy, 2002). Within the layout of these spaces is also the opportunity to better encourage outdoor activity by ensuring that the residents feel safe and secure while being active outside. More detail of how the built environment's design handles the feel of safety and security in the following paragraphs.

> ***2a - Safety*** - Another effect the built environment has on the capability of being physically active is the safety provided through the design of spaces within the environment. When people within a community feel safe, they are more likely to go outside, do something, and be physically active. Providing a sense of safety within the built environment provides a comfort for being outside without the stress of worrying about what is around the corner. Neighborhoods that are known to be "safer" are also known to have members of the community be outside far more and being active. This also provides a greater sense of unity within the community, where those in the neighborhood have a space to gather, meet, and talk with one another.

2b – Streets and Sidewalks – Included also in the area of safety and neighborhood layout is street and side walk design. Many years of study has proven that narrower streets give a sense of safety, by slowing down traffic and provide a sense of covering for pedestrians. Sidewalks promote physical activity by giving space for walking and biking. Neighborhoods with wider sidewalks that are well maintained have been known to encourage outdoor activity far more than older sidewalks with cracks all along that are also narrower. According to the European World Health Organization, **"… it is expected that if individuals perceived their environment to be unsafe, they would not be inclined to risk exposure to harm by walking or cycling or would do so only for necessary trips" (Edwards, 2006).**

Neighborhood's design of spaces, roads, and sidewalks are a major influencer in providing a place for physical activity and in encouraging residents to become active. If the spaces within the neighborhood are dense and diverse, those within the neighborhood are far more likely to walk or bike to destinations due to convenience. Also with the layout of spaces, it is crucial to design the neighborhoods in a way that is inviting. Studies have found that the aesthetics of neighborhood design also influence the decision for residents to get out and be active (Does the Built Environment Influence Physical Activity, 2005). Residents are attracted to neighborhoods with narrower streets, more tree covering, plenty of street lights, and wider sidewalks than to wide streets with major traffic flow and skinny, cracked sidewalks. If the buildings within the neighborhood are also aesthetically pleasing and taken care of, residents and visitors of the neighborhood are more likely to feel comfortable enough to get outside and explore. Providing a sense of comfort, safety, and security not only opens the door for physical activity within the community; but also brings about more social connections and unity within the neighborhood. The power the design layout and physical activity has on the community is great and will be explored in more detail towards the end this paper.

3 – *Building Program* – To narrow down the wide topic of the built environment even more, we will look at the influence a single structure can have on influencing individual's physical activity in their daily routines. There is not as much research covered in this area; but more recent reports have found that building design has the opportunity to greatly influence physical activity within a community. The *American Journal of Preventive Medicine* released an article in 2005 titled, "Influences of Building Design and Site Design on Physical Activity," that focuses on building design and site layout that is used to enhance physical activity. The article gives great examples for building program design layout that encourages physical activity within a building. Some of which consist of the following: circulation of spaces spread out for more walkability, a specialized room for exercise centered in the building with easy access and many views for observers to see in and be motivated to exercise, as well as circulation through stairs, lobbies, and corridors to give more opportunity to move (Zimring, 2005).

WHY IS IT IMPORTANT

We have already established the positive benefits physical activity has on the physical body of an individual; but the benefits of exercise and active lifestyle does not stop with the body. There are numerous benefits physical fitness has on the well-being of an individual. Exercise has been proven to increase mood, decrease anxiety and depression, boost confidence in oneself and many other benefits (Weier, 2011). As the well-being of each individual increases, so does the community as a whole. When the well-being of oneself is taken care of, the mood of the person's environment around them increases as well. Justifiably, the link between increasing community health and positive environment can be found in the benefactors of physical activity within the built environment.

WHY IS IT IMPORTANT (cont.)

Physical activity can also bring about unity within the community by providing opportunities for more socializing. "Increasing levels of participation in appropriate sport and physical activity can contribute to social cohesion, neighborhood revitalization and an increased sense of community identity" (Edwards, 2006). Physical activity goes beyond healthy body and healthy emotions in individuals, it stretches across the community and region as a whole to unite individuals together.

Even greater benefits can come as a result of the community uniting together. The stronger the community is as a whole, and the more positive the atmosphere within the community's emotional environment is, the better the community can be. With a more positive atmosphere in the community, there is a far more likely chance that crime rates can drop, substance abuse reduces, and younger residents can look to physical activity as a form of entertainment rather than alcohol and partying. Overall, the influence the built environment has on the opportunity for physical activity can make a great impact on the world by changing it for the better.

All of the research and analysis above proves that physical activity within a community and the built environment have a strong correlation with one another. Without making a conscious effort, residents are far more likely to be active outdoors or indoors if the built environment that they are surrounded by is designed in a way to do so. Physical activity is induced by a drive that is encouraged by one's surroundings. When the built environment is set up in such a way as to provoke residents within the environment to be more active on a scale that is accommodating and not minimized by time, people are far more likely to be active when given the chance.

SUMMARY

After assessing the elements of the built environment and the effect each has on influencing physical activity, the next step is to establish design elements that can be used to further develop physically active communities. The architectural design elements that can be used to enhance physical activity will again be divided into the three sections already given: region, neighborhoods, and building program.

SUMMARIZING ***REGIONAL*** BUILT ENVIRONMENT DESIGN

The regional area is more of a broad spectrum of the built environment. Regional built environment may include a specified zone or area within a city or rural setting that is focused on the study of the built environment's layout. This may include: city grids, streets and sidewalk, schools, housing, office space, stores…A major focus for physical activity in the regional context of relation to the built environment is through transportation. The mixed use of land in the regional area provides a great opportunity for residents to get in physical activity through transporting from one destination to the next. The following is a list of how to design in a way to promote for more physical activity at the regional level:

- Avoid urban sprawl as much as possible
    - Bring more density into a region by building up rather than sprawling out
- Design for diversity within the region by using different typology of buildings in a centralized location, also known as "land-use mix". Include within that mix some of the following:
    - Housing, schools, parks, offices, stores
- Arrange the buildings with close proximity to one another to make biking or walking as a mode of transportation more convenient for residents

SUMMARIZING ***BUILDING PROGRAM*** DESIGN IN THE BUILT ENVIRONMENT

On a smaller scale than region and neighborhood is the program layout of a single building structure within the built environment. Architecture deals directly with building program design, and may be one of the strongest sources of influencing physical activity within a community; but it is also one of the more difficult methodologies of promoting physical activity when space limitations and budget requirements do not allow for a specified room for physical exercise.

The following is a list of a few design elements architects can include into their building programming to further encourage physical activity, provided by the New York chapter of American Institute of Architects.

- Increase stair use among the able-bodied by providing a conveniently located stair for everyday use, posting motivational signage at elevators and escalators to encourage stair use, and designing visible, appealing and comfortable stairs
- Locate building functions to encourage brief bouts of walking to shared spaces such as mail and lunch rooms
- Provide appealing, supportive walking routes within buildings
- Provide facilities that support exercise such as centrally visible physical activity spaces, showers, locker rooms, secure bicycle storage, and drinking fountains
- Design building exteriors and massing that contribute to a pedestrian-friendly urban environment and that include maximum variety and transparency, multiple entries, stoops, and canopies

SUMMARIZING ***NEIGHBORHOOD'S*** BUILT ENVIRONMENT DESIGN

Neighborhoods are a more specific location within a region that narrows down the spectrum of region within a community by either zone or square footage. In a neighborhood's built environment, one looks more closely at the building typology within a certain radius; as well as sidewalks, streets, and aesthetics of the buildings within the specified neighborhood.

As already mentioned above, mixed-use in a neighborhood greatly encourages physical activity within that specific community by transporting from one destination to the next through use of biking or walking rather than automobile. The design of streets and sidewalks are also benefactors towards more activity within the community. A few examples of design implementation that can be used to better the neighborhood layout are as follows:

- Interconnectivity within the neighborhood through streets and sidewalks
- Narrow streets to reduce speeds of vehicle traffic through neighborhoods
- Wider sidewalks that are well-maintained
- A lot of tree covering and street lights for safety precautions

The built environment not only influences the opportunity for more physical activity; but also provides the opportunity for a stronger community that is united together and builds on a positive atmosphere. Those who take care of their physical well-being have been known to be more happy, more positive, and better off than those who do not take care of their physical bodies. In turn, communities with healthy and active individuals are overall more likely to have less crime, reduced substance abuse, less suicide rates, and a more positive atmosphere in the community. Architects have a grand opportunity to not only design great buildings and cities; but better people.

PROJECT JUSTIFICATION

The premise for this thesis brings two of my biggest passions together, architecture and physical activity. I believe that both are play a major role in society today. Architecture influences the way in which humans interact with the environment, natural world, and with one another. Physical activity, more so physical fitness, is how human beings interact with the environment, whether built or natural. While architecture deals with what I would title the genetic make-up of the physical world, physical activity deals with the genetics of the human body on a smaller scale than architecture does. Even though physical activity doesn't directly influence the built environment through design, I strongly believe that design of the built environment has a direct correlation with physical activity within a community and individuals.

Urban design, site location, space layout, building programming…are all part of the built environment and influencers of physical activity. Cities that are known for their active communities have much of the architect's and urban planner's designs to thank for that. Architects who take great consideration of connectivity, diversity of building typology and spatial programming within buildings, and density within regions can strongly influence the way in which the community feels, how individuals interact with one another in the community, and the opportunities the community provide to be active.

I have such a strong passion about this because I firmly believe that architects can make a major difference in the health of individuals and entire communities by designing in a way to greatly promote physically active lifestyles. Those who exercise and have the opportunity to be outdoors as much as possible are far more likely to have a better intrinsic value of self-worth. Enhancing self-worth and emotional well-being in individuals further enhances communities; because those within the community are therefore happier, more social, and "better" as human beings in a sense. Bringing about a better sense of "being" in individuals can turn communities from separate, unhappy, unsatisfied, anti-social beings into happier, more extroverted beings who want to better other lives. This will in turn have the opportunity to reduce crime, substance abuse, rape, abuse…in communities, to the regions, and into the nation.

HISTORICAL CONTEXT

HISTORY OF PHYSICAL ACTIVITY

Physical activity has been around from the very start of life. Humans have had to exert extreme amounts of strenuous physical activity in order to survive since the start of civilization. Physical activity has been used in order to survive. Early civilizations would exert extreme amounts of physical energy for hunting, gathering, and agriculture. Before automobiles were invented, people used physical activity to get from one place to another. In the earlier pioneer days in the United States, physical activity was used daily to hunt, grow crops, build houses, transport from one place to the next.

Physical activity is not a new remedy for a healthier life by any means. From the time that history has been recorded, ancient civilizations have turned to physical activity as an answer to longer life and prevention from many diseases. Early philosophers linked physical fitness to the health and life longevity of human beings. According to a report done by the United Sates Surgeon General titled, *Physical Activity and Health,* physical activity promotion for the betterment of health has been recorded as far back as 5th century B.C. (Physical Activity and Health, 1996). Greek physicians were among the first to use physical activity as a form of therapy and healing for the body, calling it *"gymnastics medicine."* Two of the most known Greek physicians to promote physical activity as a healing process for the body were Herodicius (480 B.C.) and Galen (A.D. 129) (Physical Activity and Health, 1996). Fast forward to 1830 in a book titled *Domestic medicine, Or Poor Man's Friend,* author John Gunn emphasized the value of natural medicine by means of active lifestyle, exercise, and rest rather than prescribed medicine (Gunn 1836).

Finally, in the early 1900's, the importance of physical exercise became more prominent and soon came into the education system now known as P.E. (physical education). The meaning for bringing physical exercise into the education system was not only to implement more activity among the population; but specifically get children actively involved in exercise and educate the youth about the health and function of their bodies. During this time, exercise programs were brought over from Europe into the American system. Founders like Catharine Beecher in 1856 and Dioclesian Lewis in 1883 brought in new forms of the Greek methodology of "*gymnastics medicine*" into America. Since then, physical activity, education, and physical fitness has become a popular subject across America; but with that has been the biggest battle to get the population to become more physically active than ever before.

HISTORY OF BUILT ENVIRONMENT IN AMERICA

Organization of structures with land and spatial layout date back to nineteenth century where many professionals united to bring form out of chaos. **"*During this time a wide range of architects, planners, activists, politicians, and other professionals sought to forger orderly, safe and efficient cities out of chaos of the industrial era*" (Frank L, 2003).** During the industrial era, cities became crowded and dirtied by mass chaos of reformation without organization. Architects awakened a new idea to conceptualize "healthy" cities through urban planning of the landscape. The industrial revolution brought sweeping changes in Europe and across the seas over to America during the nineteenth century. These changes also brought about a major increase in technology and trade of goods, migration, and an influx in population of cities. The United States alone grew from 300,000 in 1800 to 6.2 million in 1860 (Frank L, 2003). The boom in population growth and industry also brought in overcrowding, poverty, increase in crime, and decrease in health. The industrial revolution created a lot of problems in the environment by polluting the air and contaminating the water with the extremities from mass production, leaving over half the population in the era deathly ill. As a result of such unsanitary practices, a movement towards sanitation reformation began in mid-nineteenth century.

In 1864, the Council of Hygiene and Public Health was created in New York as a response to the health scares and needed sanitation within the cities. Through the workings of the sanitation reformation, the council found that causes of many of the epidemic diseases can be traced back to the pollution of the cities that had poor sanitation practices in place. As the sanitation reformation become more popular in the mid-nineteenth century, architects and landscape architects grabbed ahold of the opportunities urban design and development could bring to the health of cities. Architect, Fredrick Law Olmsted, known for designing New York's Central Park, started a movement of changing the way American cities were designed. In the 1860's Olmsted started designing suburbs and parks, a new movement that was not seen as important during the industrial era, became more prominent as the knowledge of health and urban design became more urgent. Olmsted wrote many scholarly journals introducing the movement that awakened designers to the link between design of the built environment and the health of cities and residents by emphasizing the importance for designers to plan in such a way as to remove 'sickening' and 'deadly' gases out of the city.

HISTORY OF BUILT ENVIRONMENT IN AMERICA (cont.)

Olmsted changed much of the way urban designers looked at space and the connections they should have with one another. He pushed the need for cities to be more sprawled out and have more open space, allowing for more direct sun-light and fresh air in cities. **"*Olmsted blamed narrow streets and overcrowding, in particular, for creating the environmental condition in which disease could flourish*" (Frank, 2003).** Olmsted changed much of the face of American landscapes and urban design through implementation of more parks, trees, wider streets, and suburbs to give cities room to breathe, sanitize pollution of the air, and provide more sun-lighting into the cities. The setting Olmsted made for urban design layout was soon followed by physicians findings on bacterial growth and contagious diseases.

Toward the end of the nineteenth century, medical physicians found that the worst epidemic of diseases were linked to contagious bacterial infections that were easily spread from one counterpart to another. The new discovery of bacteriology and contagion occurred during the same time a housing reformation was happening between 1900 and 1914. While medical physicians were stating that disease transmission was occurring due to public sanitation and had no link to the city development, housing reformers were strongly pursuing the need for change in city and housing spacing. Housing reformers were strongly pushing the need for more open spaces for air and light to prevent more diseases. Two of the most known housing reformers recorded in history were Jacob Riis and Lawrence Veiller, who centered their work on sunlight and air in high density urban areas. Veiller firmly believed in the relation architecture and urban design have with the health of residents physically, morally, and psychologically. He pushed strongly for building height limitation, lot depth, block sizes, streets, and city zoning. The codes set by Veiller helped establish the first zoning ordinances in New York in 1916. In today's current world, zoning ordinances are the backbone behind any building design project or urban planning.

HISTORY OF BUILT ENVIRONMENT IN AMERICA (cont.)

The movement of zoning began to spread cities out more and more in all directions, just as Veiller and Riis had been pushing for. At the same time, the zoning ordinances brought about another issue, urban sprawl. With an intention to bring in more sun-light and open spaces for air, the cities grew out more and more, covering even more of the landscape. Then, the invention of the automobile resolved transportation difficulties of long distances within a city. Within the same time frame of automobiles and major urban sprawl, came about a movement for "garden cities" as a counteraction against sprawl and dependency on the automobile. Not many attempts were made for "garden cities;" but the special layout of garden cities is a movement from the 1920's that much of today's theme, one hundred years later, of urban design is beginning to rely on. Garden cities would be centered on neighborhood units that are protected with "walls" of arterial highways. Neighborhood units would schools, playgrounds, shops, and safe neighborhood housing environments all interconnected by narrow streets to improve walkability.

Today, urban cities are facing an epidemic. Urban sprawl has become the leading solution to population growth. As cities continue to get bigger and bigger, urban designers and contractors look to building in new development areas where there is more space for construction. Urban sprawl is understandable as the viable solution for growth when reflecting back on the history of urban design; but has caused an issue in community development. Not only has urban sprawl decreased the amount of physical activity the population uses; but also weakend community unity and development within neighborhoods. If time could be reversed, developers would have probably used the "garden cities" design as the basepoint for any development.

> ***"…the garden cities would be true communities that would fight residents' alienation from each other and from their surrounding (Allen 1977…"It is true that had Howard's original design proposals been faithfully adopted, we likely would have communities much more oriented toward nonnotarized transportation than we have today." (Frank, 2003).***

HISTORY OF DICKINSON, NORTH DAKOTA

During early 1800's the Northern Pacific Railroad had taken off and began to frontier further west. In the spring of 1880, new construction crews worked on a rail line heading west; but needed a breaking point for the rail line somewhere between the Missouri River and Montana Territory. E.F. Messersmith of St. Paul was appointed as overseer of this resting point. He and his family moved out to a location called, Pleasant Valley, to frontier the area that would be used for the railroad. The territory of Pleasant Valley would later come to be known as the city of Dickinson, named after Wells S. Dickinson, Senator of New York.

Business in Dickinson began to boom in 1882 as more and more people heard about the new railroad post along the Heart River. The Messersmiths finished their railroad hotel during this time, and provided a place for even more business men to come in and set up shop along the railroad. Hunters from around this area used the railroad station to ship out buffalo hides and other game from the surrounding land. By 1883, the first ever issue of the Dickinson Press was sent out. In 1886 the newspaper building was soon established as the first court house, and a jail was put up by a few two-by-fours. It wasn't until about a decade later that the area of Dickinson became known as the "bread basket of the world," producing grain crops and vegetables for the entire nation. By the time the city was thirty years old it had grown from a small frontier home to a flourishing city with two flour mills, bottling works, warehouses, hotels, and over fifty business, many churches and schools, business college, and even a hospital; and soon gained the name of Queen City of the Prairies. In 1918, Dickinson State University was established, bringing in a surplus of even more people and putting Dickinson on the map far more.

Dickinson boasted of its aesthetic beauty on an urban scale. The updated roads went from dirt and gravel became paved with cement. The streets were lined with trees as a contrast to the rolling plains that surrounded the town. One of the major resources for the district is a brick manufacturing company that supported much of the aesthetics of brick buildings in the city of Dickinson. As time has passed on, "The physical appearance of the city of Dickinson has been changing year by year. Old buildings and landmarks have been disappearing one after the other." The red brick that once made up almost all buildings at the time began changing and the buildings starting to modernize more and more.

HISTORY OF DICKINSON, NORTH DAKOTA (cont.)

The landscape of Dickinson and its surrounding area is painted by rolling plains, tall wheat grass, and the beautiful Badlands not too far away; but there is little to offer in the terms of recreational activities. Dickinson has slowly worked its way up to becoming more active over the years. Rocky Butte Park was the very first site within the city to offer recreational activities for local residents. The park is located on top of one of the highest points in the city and contains an acre of trees and walking paths within the park. For the longest time, the park had been the number one place for outdoor recreation such as walking, biking, or just an outdoor picnic; and it still is to this day. Sometime during the mid-1900's, the city added an outdoor pool called Whitney pool directly across the street from Rocky Butte park, adding even more outlets for physical activity for people all around. Soon afterwards, the Dickinson Dam was built, enhancing the cities source for recreational fun even more by providing a place to fish within the city of Dickinson. Through the years, the city has added other recreational facilities including a community center used for events and ice skating in the winter, as well as a Parks and Rec organization that facilitates summer and fall activities for youth and children. Finally, the most recent addition to the recreational facilities has been the new West River Community Center.

FIGURE 9.0 – Historical Downtown Dickinson
(Historic Preservation, Dickinson Museum Center)

The new West River Community Center has been the biggest contribution towards getting the community physically active. Before the center was built, residents of the city had been restricted to only summer and decent fall months for providing recreational activities for residents. The addition of the wellness center has progressed the town in terms of recreational activities as a source of entertainment for the community. The center provides a space for cardio workouts, exercise equipment, a track, basketball and racquetball courts, as well as an indoor lap pool and playground. The facility is a great investment in the history of the city for more physical activity in the community; but there is still a lack in furthering the involvement more and prompting others to get more engaged in being active.

SITE NARRATIVE

The western part of North Dakota is currently booming with new business in the form of oil. Since the start of 2009, people from all over the country have flooded into the western portion of North Dakota for jobs, mostly in the oil business. Dickinson has been greatly impacted by the "oil boom." There are signs of major population growth all over town as hundreds of new housing projects, hotels, restaurants, and various other restaurants are being put up today. The influx in oil and population has grown the city geographically more and more. Throughout the past five years, the town of Dickinson has sprawled a minimum of ten miles in every direction. This increasing growth is great for business and those looking for employment; but has also negatively effected the community in a negative way. Local businesses are struggling to keep up with major corporations who are flooding in by the minute and crime rates have drastically increased, and a blindness in greed has led to the city of Dickinson quickly turning from "small town community feel" to "big city rush."

The chosen site for this thesis is picked specifically in hope to turn some of the negative effects around within the community. The site is located at the heart of the downtown area. While there has been very slow growth in shops and restaurants within the downtown area, there is a major lack of pull for residents in the community to spend frequent time downtown. The current city plaza has very little for attraction to keep those in the downtown area to stay there; but if there was an outlet for activity within this square more people would draw more attention to downtown Dickinson. Therefore, the choice of site is highly intentional with the given thesis. The goal for the site location is to bring more people downtown, bringing more people in by providing a source of entertainment that affects the individuals in a positive manner that will, in turn, positively effect the businesses and downtown area, and bring more of the community together; which will help to increase local residents health and emotional being, while also seeking to lower crime rates in the community.

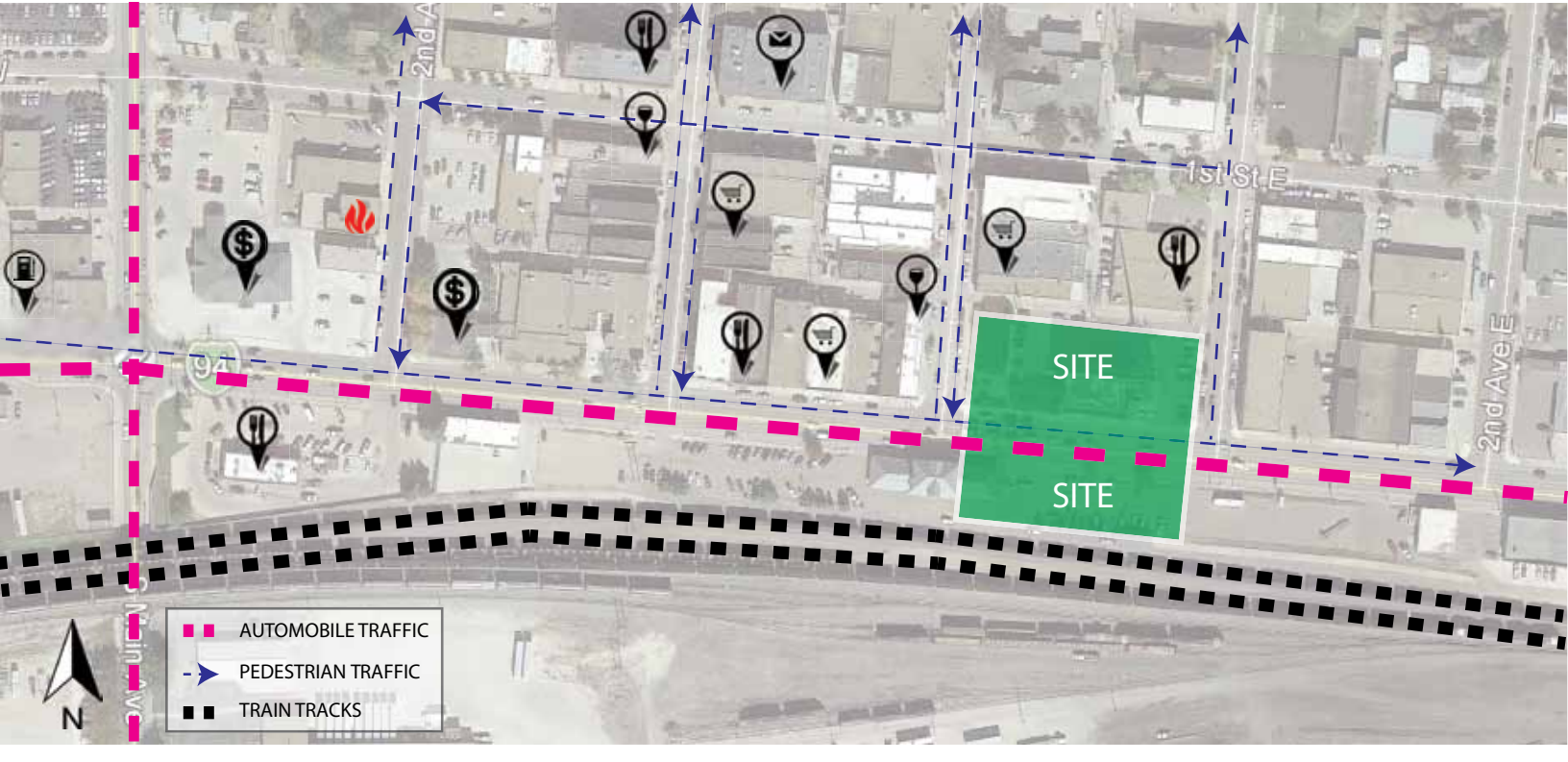
A key aspect in designing a place for physical activity is to provide a location that is convenient, heavily trafficked by vehicular and pedestrian traffic, but is also well protected. The chosen location is heavily populated with passing vehicles traveling east and west, as well as pedestrians who shop or dine downtown. There is not a lot of elements within the built environment on location that provide a feeling of safety while on site. There is a variety of spaced vegetation in the plaza square, but the parking lot is completely open.

SITE NARRATIVE

Currently, the site location is occupied by a city plaza, a six story brick building, and an empty parking lot across the street. The city square does not have much to offer in the form of attractions. There are some trees, bushes, and flowers that cover the plaza square. The square is brick laid with a water fountain in the center and a few benches around it. To the east of the plaza is a small private parking lot with only a few cars parked in it. Past that is one of the tallest buildings in Dickinson. What was once a hotel, is now a very old and abandoned brick skyscraper that overcasts the rest of the site. Only a few of the floors are used, and there is nothing aesthetically pleasing about the building.

Across the street is the train depot that is hardly visited. Though, this is not a part of the chosen site, it is a key building in the aesthetic features of the site. The historic train depot has not been well-kept and is falling apart, much like the six-story brick building located on the site. The parking lot to the east of the train depot is also run-down and hardly used. Few people choose to park their cars here if they are going downtown for any means of business. This is also an issue for any type of structure to be located on this site since the BNSF train tracks are directly to the south of the parking lot and are constantly flooded with trains passing by.

SITE ANALYSIS - QUALITATIVE



BUILT FEATURES

The site itself consists of a small park/plaza in the northeast corner. Directly west is a smaller parking lot used by local business owners and a six-story building, mostly abandoned, besides one business on ground floor. Across the street is a train depot with a parking lot directly to the west of the train depot; which is where the southern portion of the proposed site is located. South of the site are the train tracks used by the BNSF Railway Co.

FIGURE 10.1 – Parking Lot of Site

BUILT FEATURES: approximately 90 buildings in 2 block radius

Within five min walking distance

- RESTAURANTS: 7 (3 bar)
- GROCERY STORE: 1
- BANKS: 3
- LOCAL SHOPPING: 13
- POST OFFICE: 1
- LIBRARY: 1

DISTRESS

Distress is evident on all section of the site. Neglect and abandonment has caused much of this distress. The parking lot by the train depot is layered with cracked asphalt and decorated with weeds all along the parking lot and sidewalk. A 19489 fire destroyed much of "Villard Hotel," the building in the northeast corner that has not been fully restored and has been left vacant on all floors above the second level. Even the public square includes signs of distress as it has not been well-maintained. Brick lining the paths in the plaza are cracked and uprooted, the center fountain is broken, and vegetation is not well kept.

FIGURE 10.0 – Jordheims's Gym, Downtown Dickinson

VEGETATION & WIND

The only given vegetation on site is in the plaza area. A few coniferous trees and a couple deciduous trees are scattered within the plaza area. Bushes line both sides of plaza on street sides of Villard Ave and Sims St. Twenty foot deciduous trees line Sims St. There is no vegetation in parking lot on south side of site. The plaza illuminates with green covering almost all of the plaza square during the summer and into early fall months. Throughout the year there is hardly any vibrant vegetation painting the downtown area aside from the plaza square.

Dickinson is a fairly windy city, with average wind blowing at 21 mph. During winter months the wind increases the cold temperatures even more. On the given site, the surrounding buildings protect the site from cold north westerly wind. The south portion of the site is not as well protected, with only the train depot to block the wind; therefore leaving

FIGURE 10.2 – City Square Plaza West View

FIGURE 10.3 – City Square Plaza South View

NOISE

With the train tracks located directly south and across the street from the chosen site, there is a great amount of noise flooding into the sire constantly throughout the day. Villard Ave is highly traveled on the site during all hours of the day, every day of the week. Noise will b a problem for the chosen site due to the train's horn and movement, as well as busy traffic. Vegetation will help to buffer the site from noise and the water fountain that is already located on site will also be used to help drown out all given noise.

VEHICLE & PEDESTRIAN TRAFFIC

The sire is located in a central portion of downtown Dickinson with no bike lanes and long distances, automobile use is the most common choice of travel for residents. The heaviest portion of traffic is located three blocks west of site. Highway 22, or 3rd Ace W, is the main road running North and South, through the center of Dickinson. Villard St W, which runs East and West through the middle of the site is also heavily trafficked. Sims St, to the West of the site, is not as busy; but leads to several highly populated businesses throughout the daytime hours of the week.

Pedestrian traffic is also high for the given site location, due to the local business in the downtown area with minimal parking for downtown stores. Walking is top choice for those who park in the train depot's parking lot and walk down Sims St to get to desired businesses; but it is not the most suitable for pedestrians due to cold temperatures throughout the year.

HUMAN CHARACTERISTICS

The north part of the sire contains much character and human intervention. the plaza has built features designed to draw local shoppers, or pedestrians into the sire. The plaza is not visited frequently; but it used by pedestrians as a resting point off and on. The rest is fairly abandoned. The old hotel building on the east portion of the site has been abandoned for several years and is hardly used. The train depot is severely run-down and not used at all. Visitors use a portion of the south parking lot, by the train tracks; but not frequently.

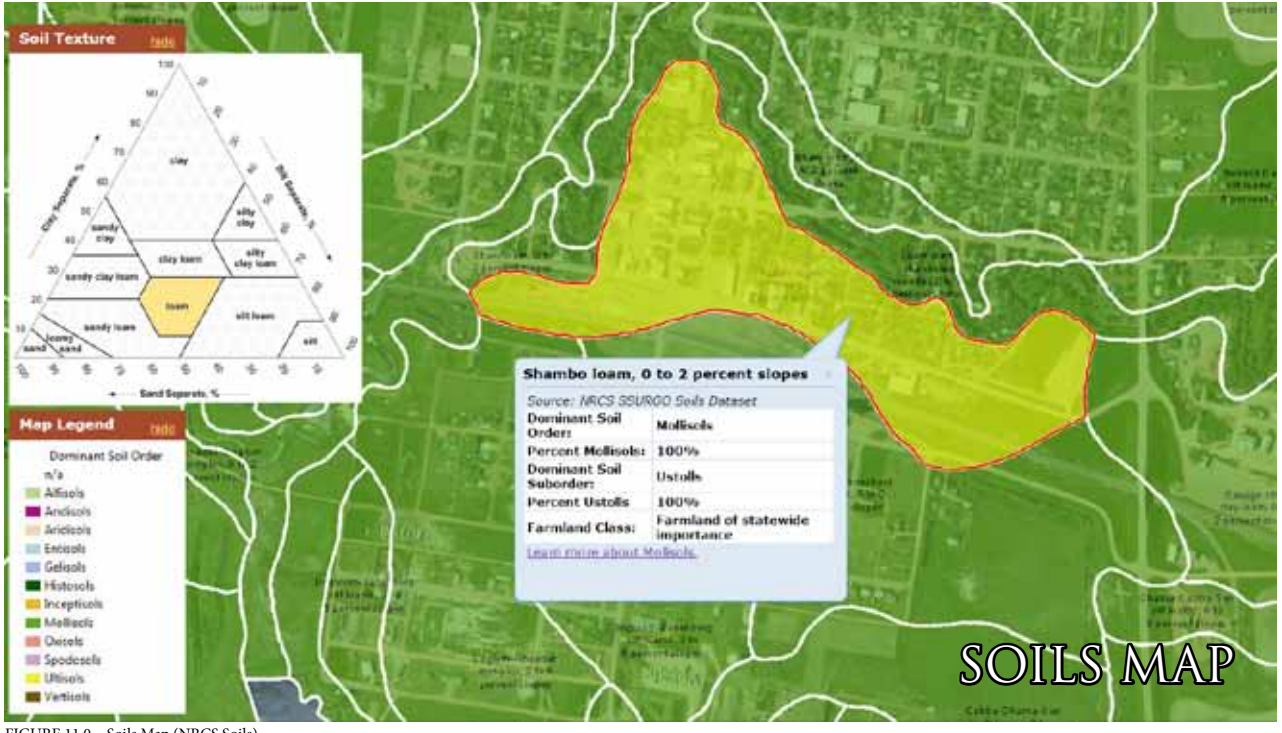
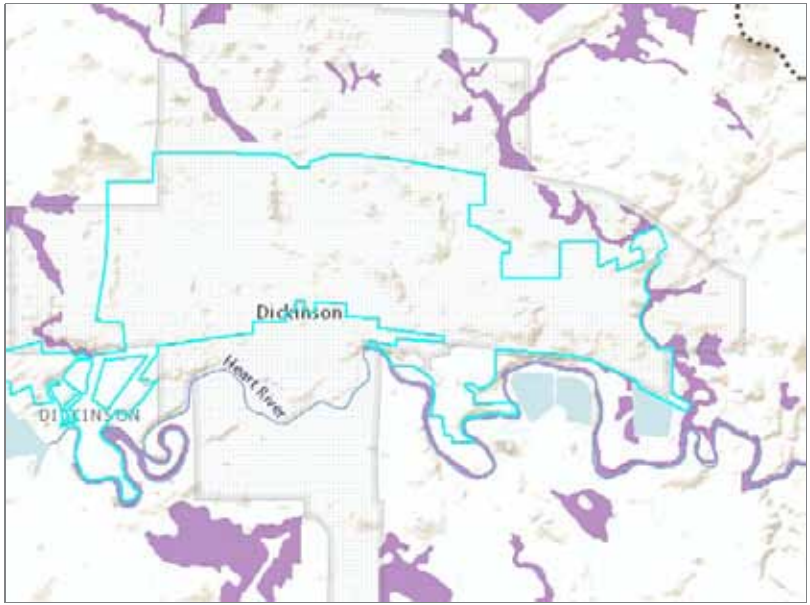


FIGURE 11.0 – Soils Map (NRCS Soils)

Area consists of 100% Mollisols. Mollisols is a "softer" grassland soild with a thick, dark surface. The soil is perfect for grazing and agriculture, and is found in a majority of the Great Plains Region. Soil texture is "loam;" which is optimal for holding water and drainage for plants.

Water Table Depth - Annual - Minimum (beta)

The shallowest depth to a wet soil layer (water table) at any time during the year expressed as centimeters from the soil surface, for components whose composition in the map unit is equal to or exceeds 15%.



Sources: Esri, USGS, NOAA | WWF, USGS, EPA, Esri

Annual Minimum Soil Depth To Water Table (beta)

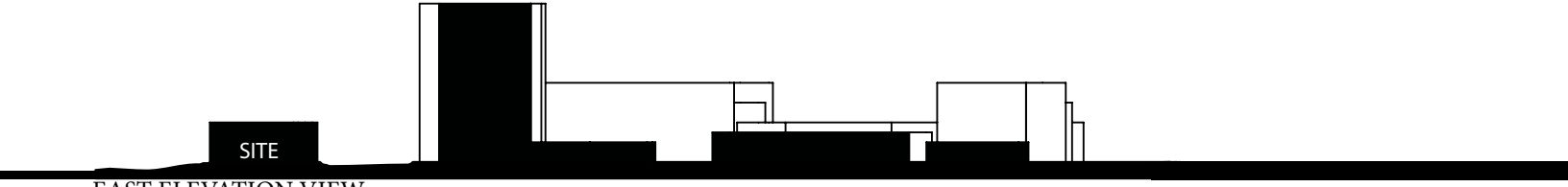
Water Table Depth - Annual - Minimum

- 0 - 25 cm from the surface
- 26 - 50 cm
- 51 - 75 cm
- 76 - 100 cm
- 101 - 125 cm
- 126 - 150 cm
- 151 - 175 cm

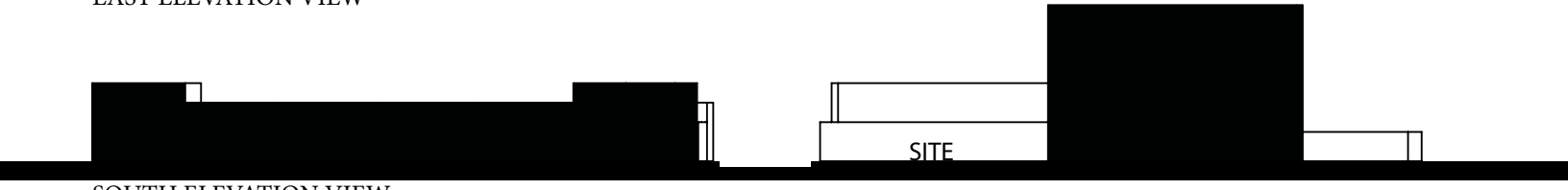
Water level for the entire city of Dickinson is at the very minimum of 0-25 cm of annual depth of water. The site location has great run-off and drainage spots. There is a small river, the Heart River, that runs through the south part of town but hasn't flooded over in the past 50 yrs.

FIGURE 11.1 – Water Table Data (ArcGIS)

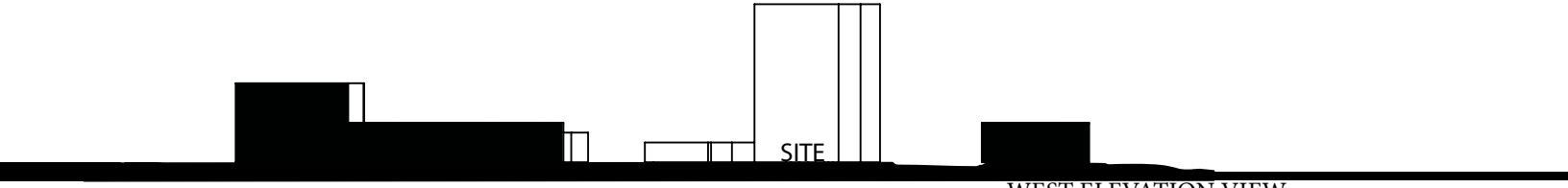
SITE ANALYSIS - QUANTITATIVE



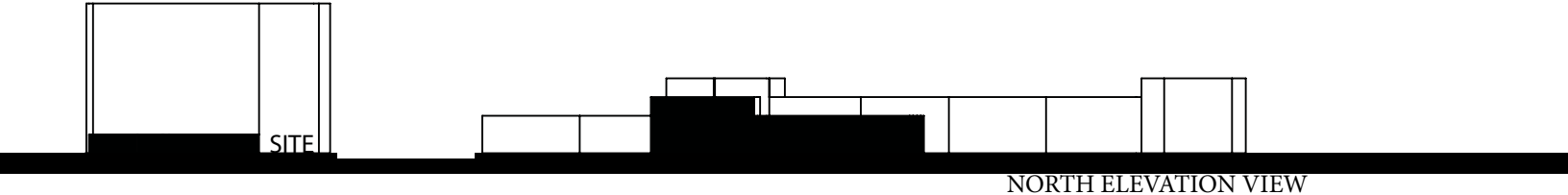
EAST ELEVATION VIEW



SOUTH ELEVATION VIEW



WEST ELEVATION VIEW



NORTH ELEVATION VIEW

FIGURE 11.2 – Topography Map (ArcGIS)

Topography of the site is fairly flat, with the slope grade being less than 4% slope change. There are few elevation changes near or on the site. South of the site drop in elevation drastically as it nears the river; but the site is not close enough to this elevation change. It does provide a great opportunity for water drainage as the site slightly slopes south towards the Heart River.

SITE ANALYSIS - CLIMATE DATA

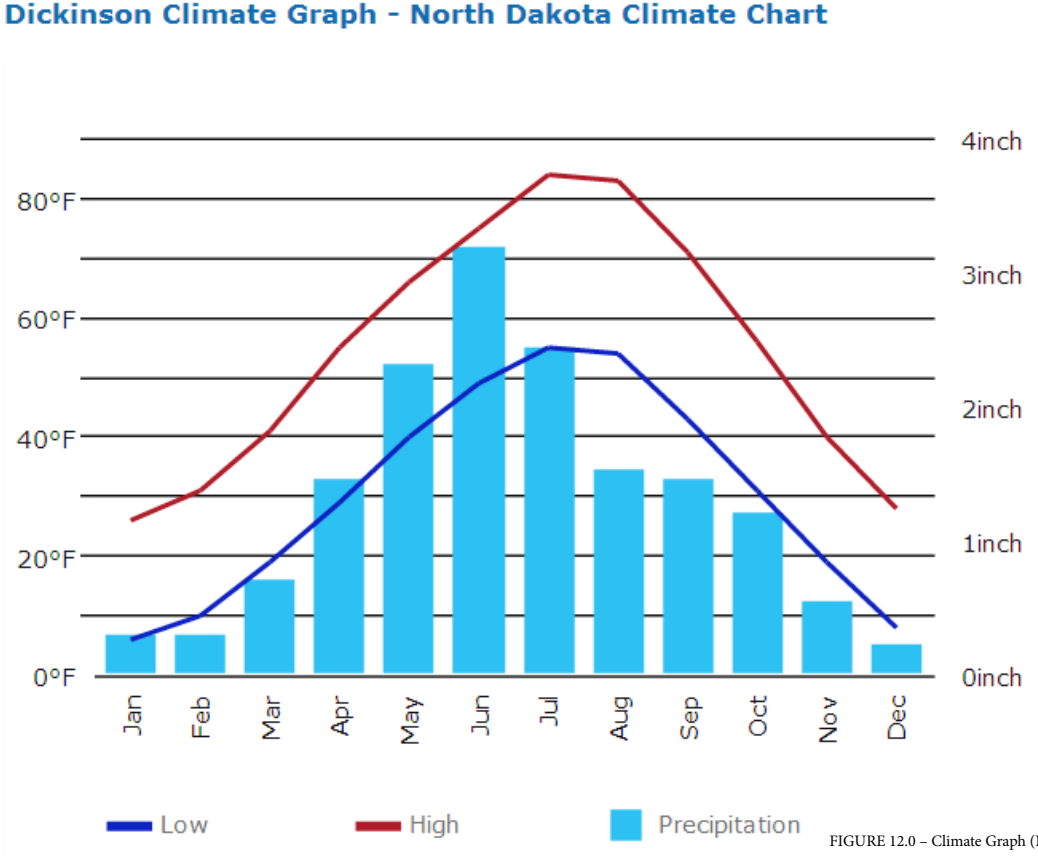
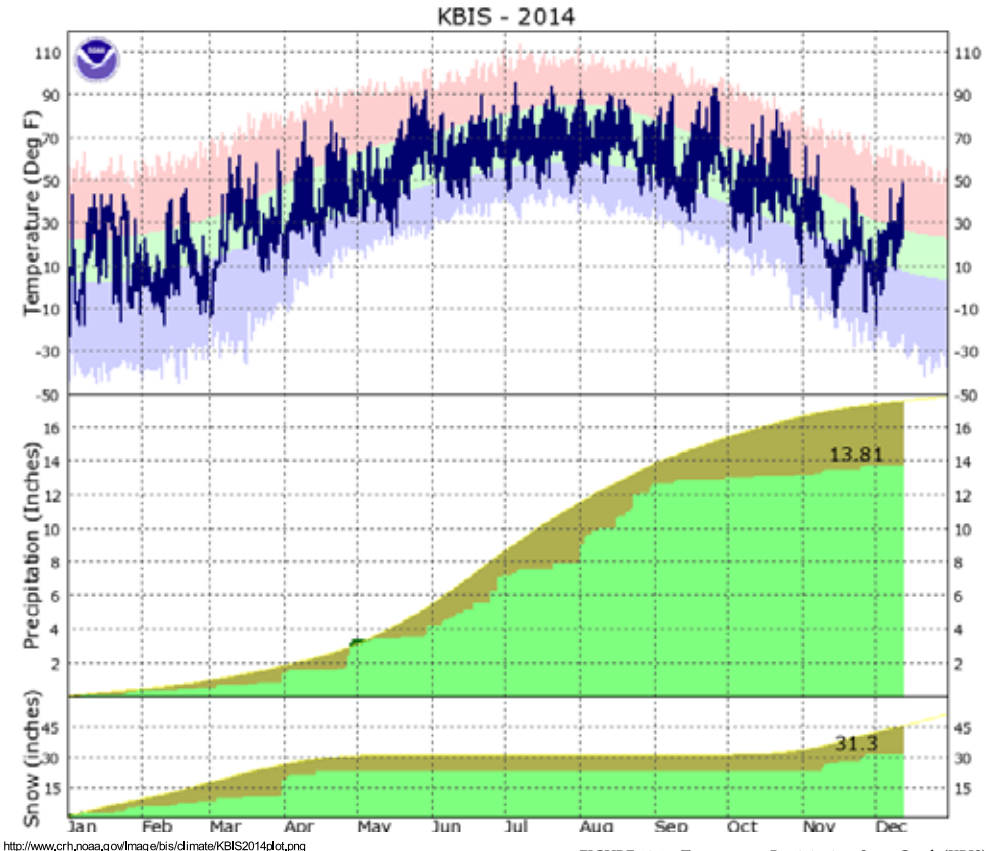


FIGURE 12.0 – Climate Graph (NOAA)



http://www.crh.noaa.gov/Image/bis/climate/KBIS2014plot.png

FIGURE 12.1 – Temperature, Precipitation, Snow Graph (KBIS)

ANNUAL HIGH TEMPERATURE = 54.7 F

ANNUAL LOW TEMPERATURE = 30.3 F

AVG TEMPERATURE = 42.5 F

AVG RAINFALL = 15.75 inch

AVG SNOWFALL = 38 inch

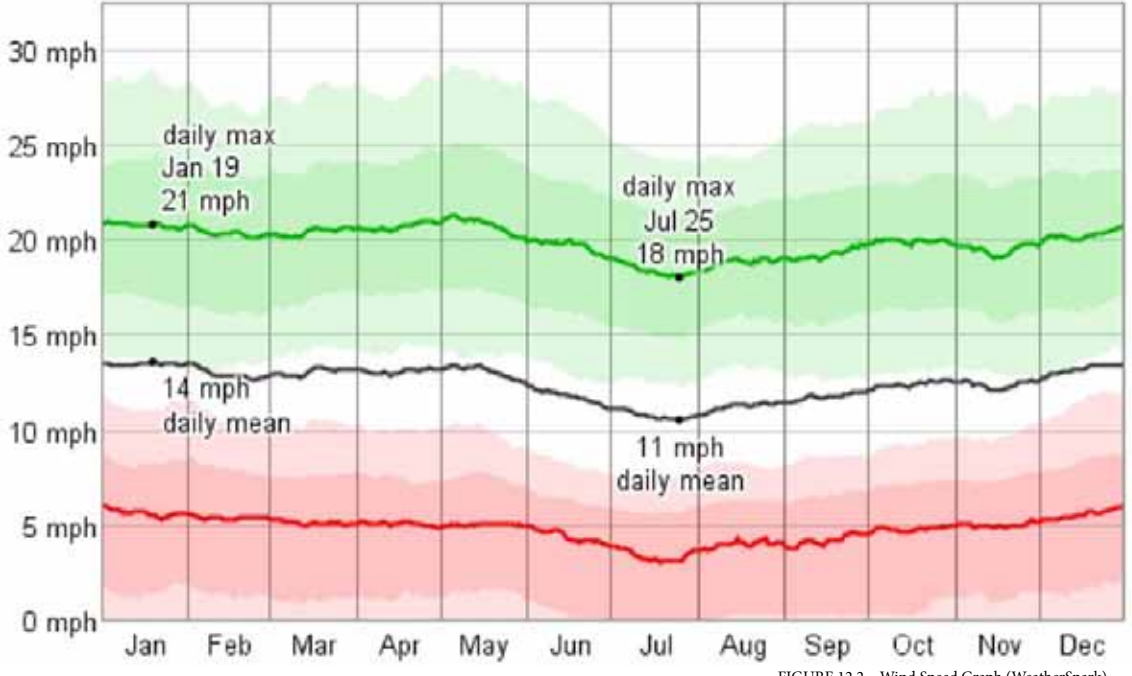


FIGURE 12.2 – Wind Speed Graph (WeatherSpark)

MAX WIND SPEEDS
= 21 MPH in Winter Months
= 18 MPH in Summer Months

AVERAGE WIND SPEED
= 14 MPH in Winter Months
= 11 MPH in Summer Months

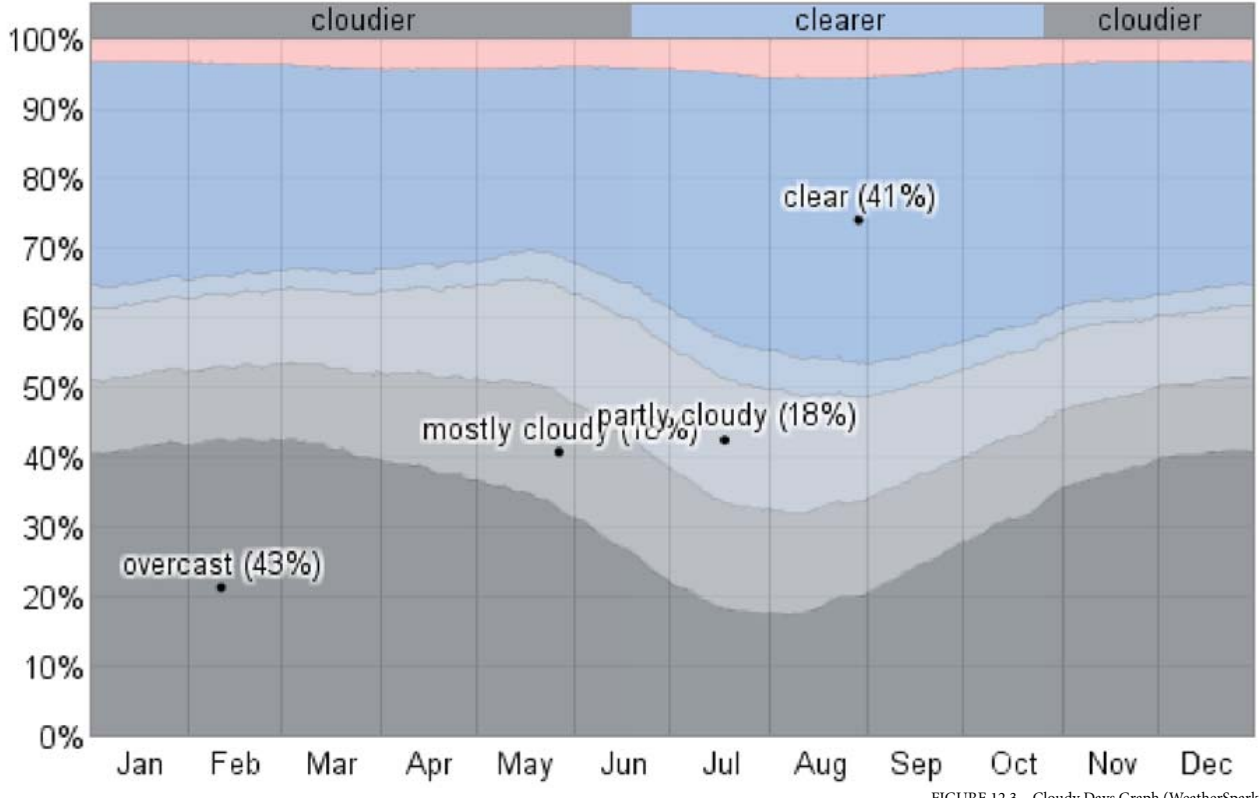
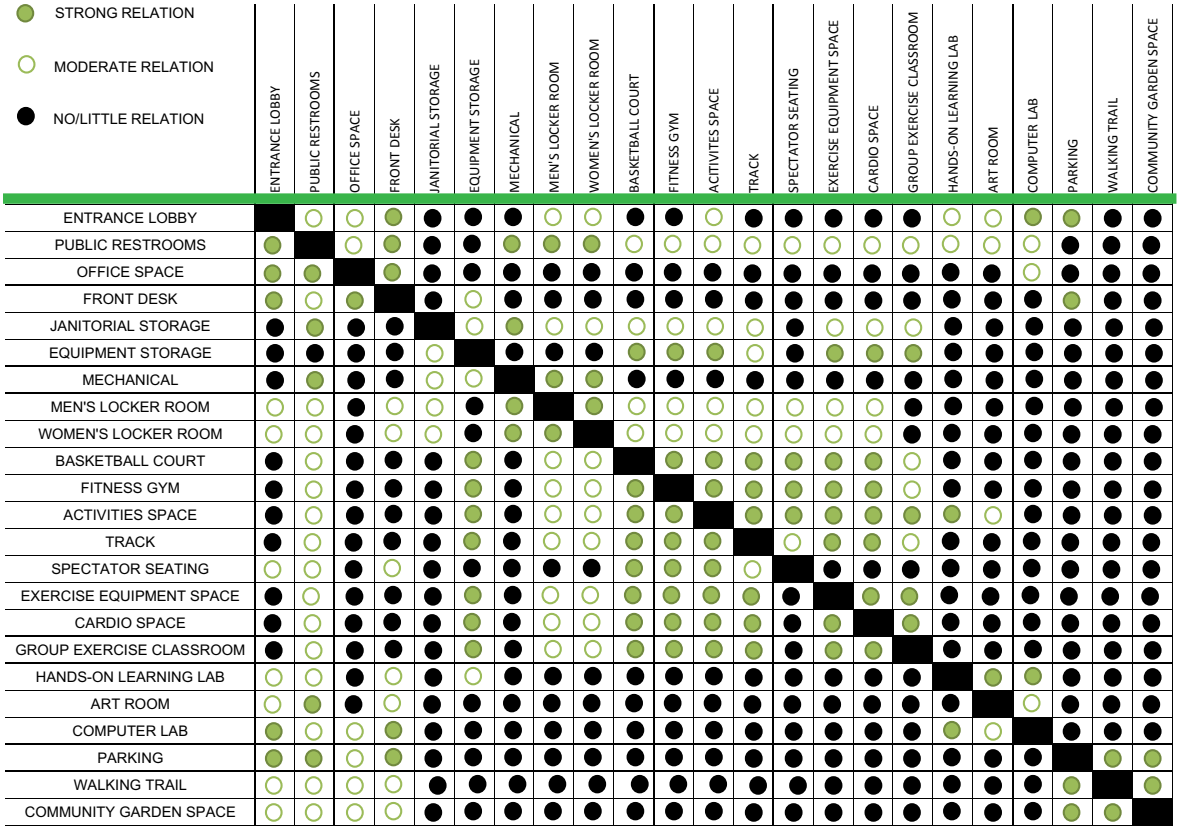


FIGURE 12.3 – Cloudy Days Graph (WeatherSpark)

SPACE ALLOCATION

PROGRAMMING - INTERACTION MATRIX



PROGRAMMING REQUIREMENTS

VISITOR/SPECTATOR

ENTRANCE LOBBY	100 sq ft
PUBLIC RESTROOMS	400 sq ft
EQUIPMENT STORAGE	50 sq ft
	550 sq ft

ADMINISTRATION

OFFICE SPACE	100 sq ft
FRONT DESK	50 sq ft
	150 sq ft

SERVICE SPACE

JANITORIAL STORAGE	50 sq ft
EQUIPMENT STORAGE	50 sq ft
MECHANICAL	100 sq ft
	200 sq ft

LOCKER ROOMS

MEN'S	100 sq ft
WOMEN'S	100 sq ft
	200 sq ft

GYMNASIUM

BASKETBALL COURT	1000 sq ft
FITNESS GYM	500 sq ft
ACTIVITIES SPACE	400 sq ft
TRACK	
SPECTATOR SEATING	
	2000 sq ft

GROUP EXERCISE

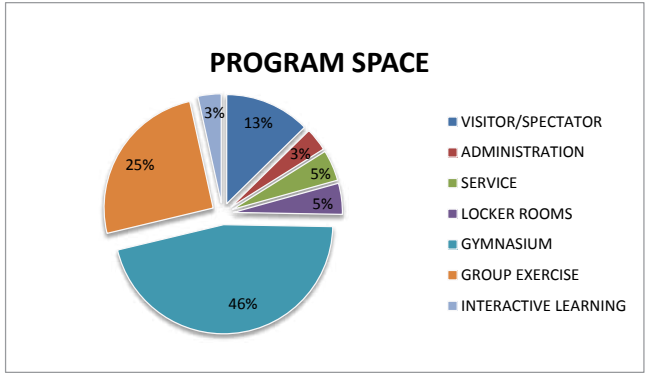
EXERCISE EQUIPMENT SPACE	500 sq ft
CARDIO SPACE	400 sq ft
YOGA/GROUP CLASSROOM	200 sq ft
	1100 sq ft

INTERACTIVE LEARNING

HANDS-ON LEARNING LABS	100 sq ft
ART ROOM	50 sq ft
COMPUTER LAB	200 sq ft
	150 sq ft

OUTDOOR SPACE

PARKING
WALKING TRAIL



Space Data Sheet

Name of Space: **INTERACTIVE WELLNESS CENTER**

Spatial Requirements

Total Square Footage:	4,000 SQ FT
Square Footage per Occupant:	20 SQ FT
Maximum Number of Occupants:	200 PEOPLE
Circulation Space (as a % of total square footage):	30%
Ceiling Height:	30 ft

HVAC

Desired Room Temperature (degrees F):	68 F
Desired Room Relative Humidity (in %):	50%
No: of Air Changes per hour required:	7

Space Data Sheet

Lighting

Lighting Levels required in space (in lux or foot candles): 500 lux

Acoustics

Sound Level desired in space (in dB): 70 dB
Reverberation Time required for space (in seconds): 3-5 sec

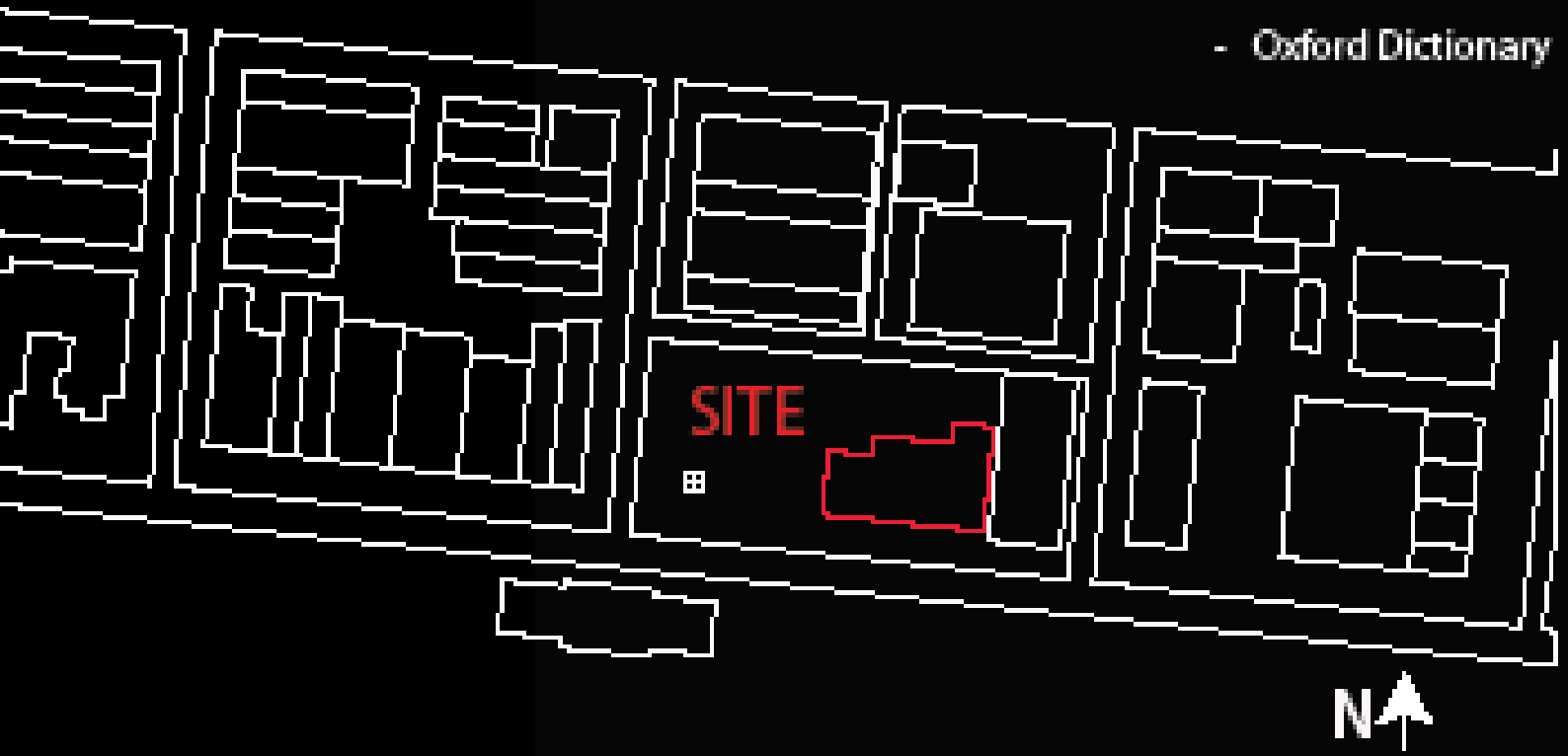
Fire Safety

Occupancy Type: All Ages
Fire Rating of Walls (in hours): 1-hour
Fire Rating of Doors (in hours): 20 min
Exterior Egress required (yes or no): yes

Final design

interactive: " of two people or things influencing or having an effect on each other"

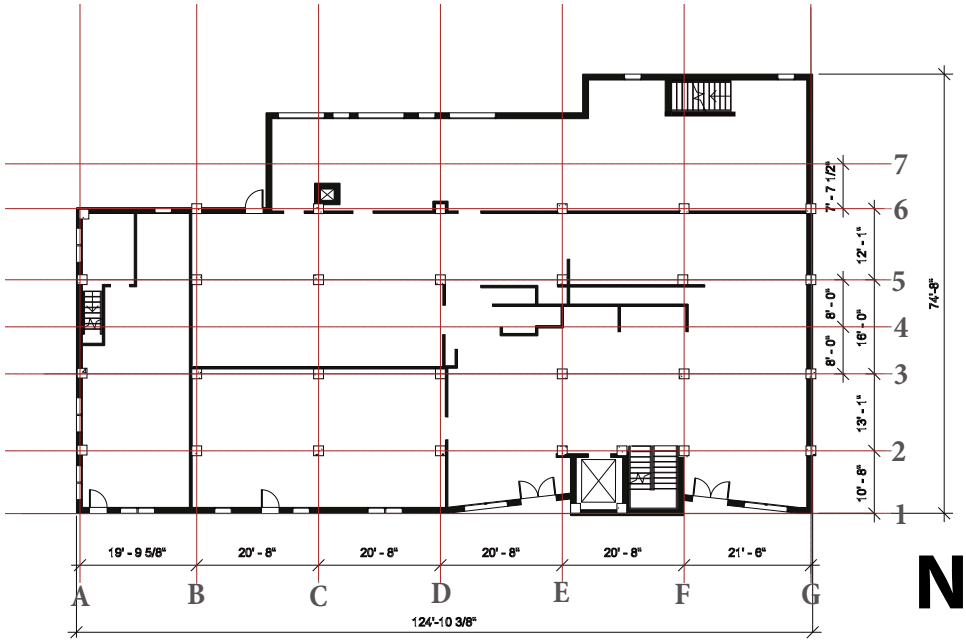
- Oxford Dictionary



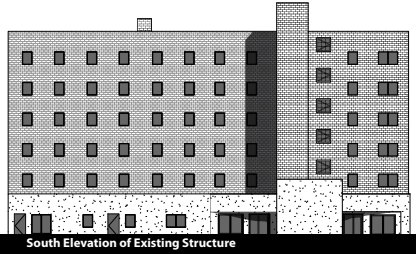
How does the built environment influence "active living" within a community?

What I had found through research and many case studies is that activity within a community is in direct response to urban layout as well as individual building space layout. "Activity" is not a specific purpose of going to the gym to work out; but rather it is a means of every day activity and how we can incorporate our daily tasks to promote healthier living.

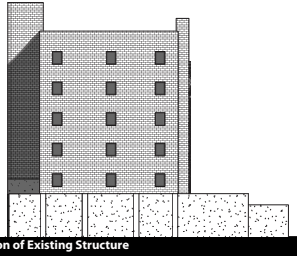
Design has far more to do with active living in a community than one would expect. Before the automobile, people would have to bike or travel by foot to get to their destination. The invention of the automobile has made transportation far easier and quicker; but along with that leads to far less people being active through transporting from one destination to another. A way to change how we look at design and active living is to ask what ways we can design to make people think more in the means of how they are interacting with a building and with the community as a whole.



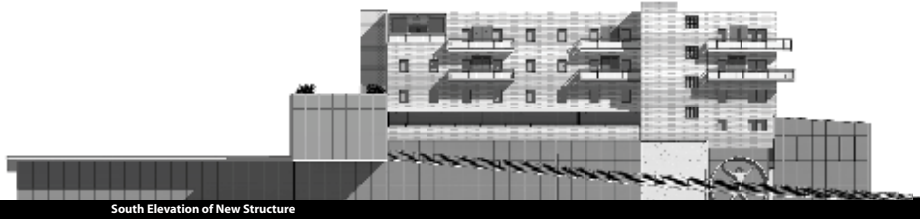
Floor Plan of Existing Structure
Scale 1:16



South Elevation of Existing Structure
Scale 1:16

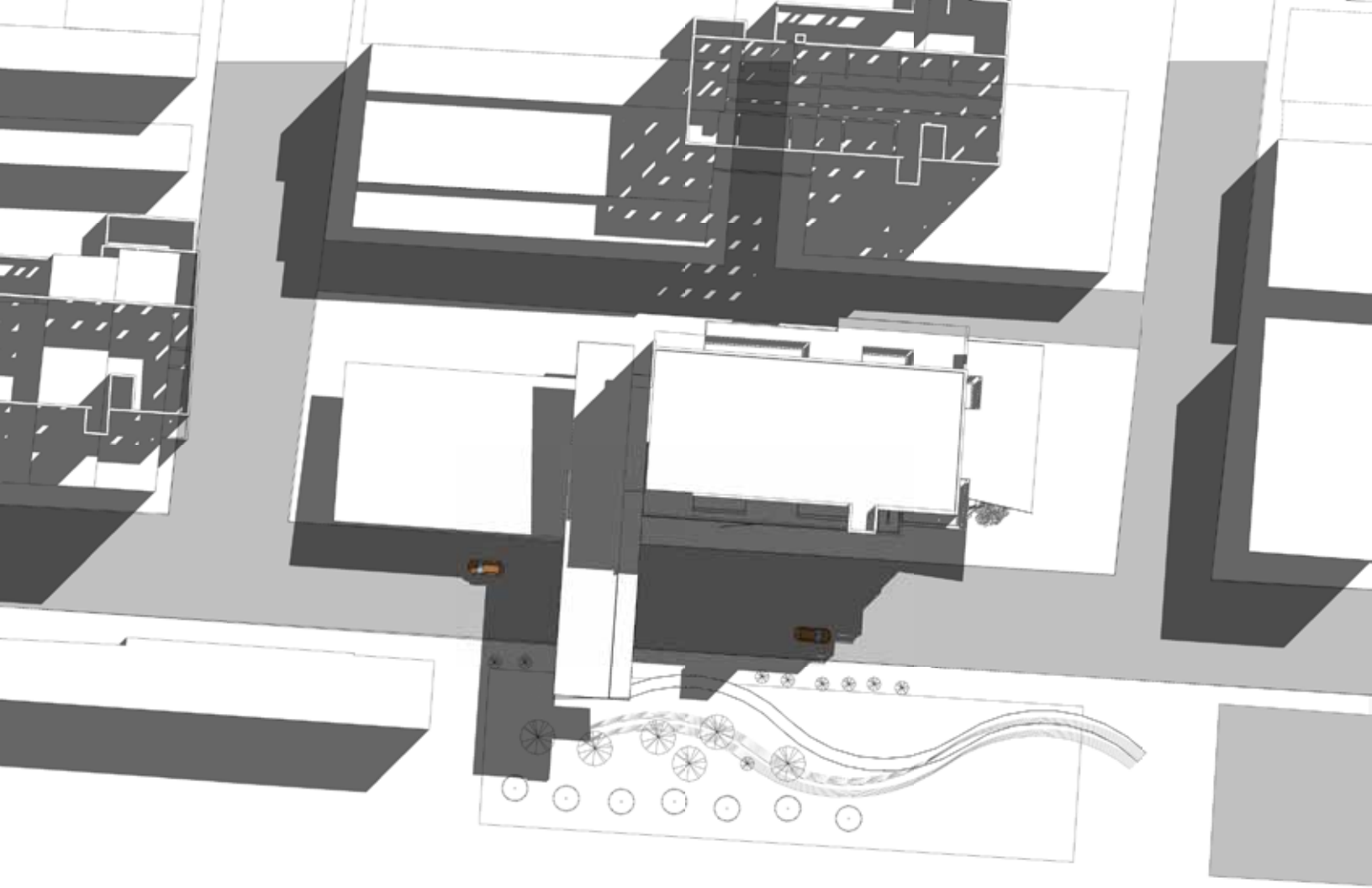


West Elevation of Existing Structure
Scale 1:16

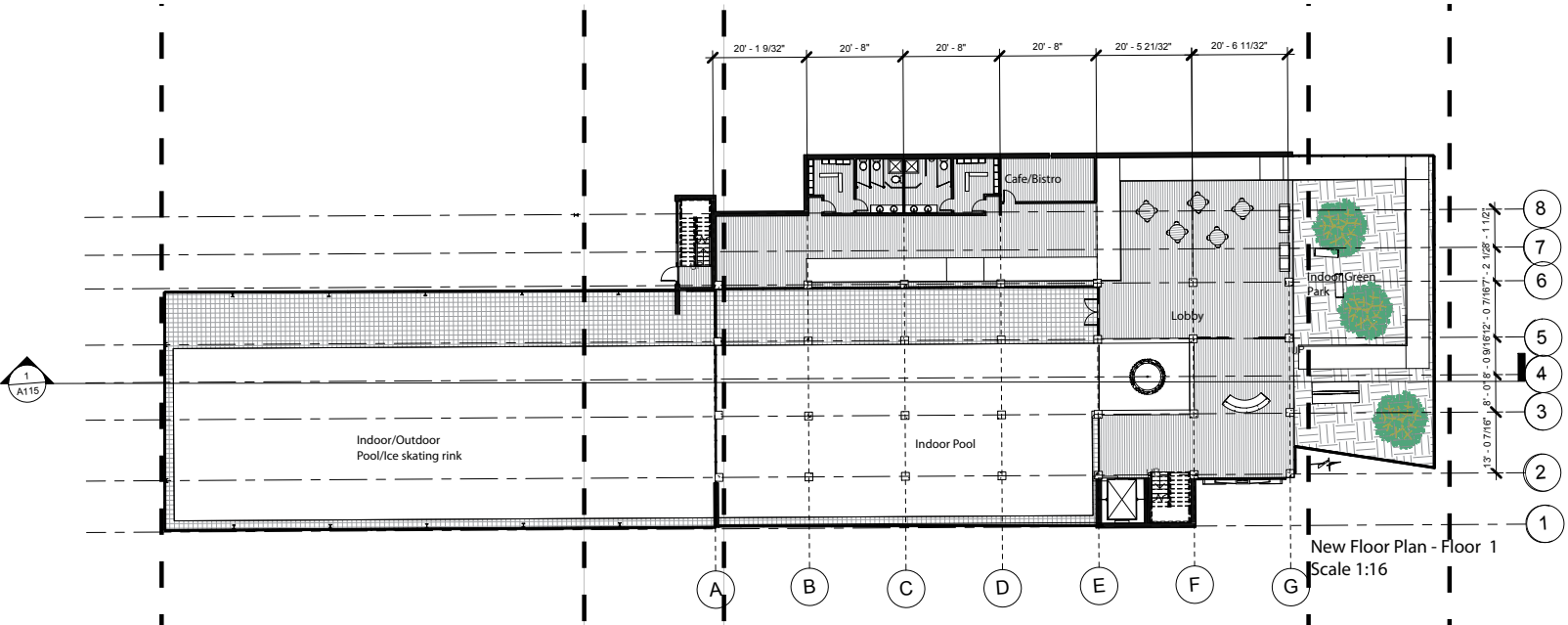


South Elevation of New Structure
Scale 1:16

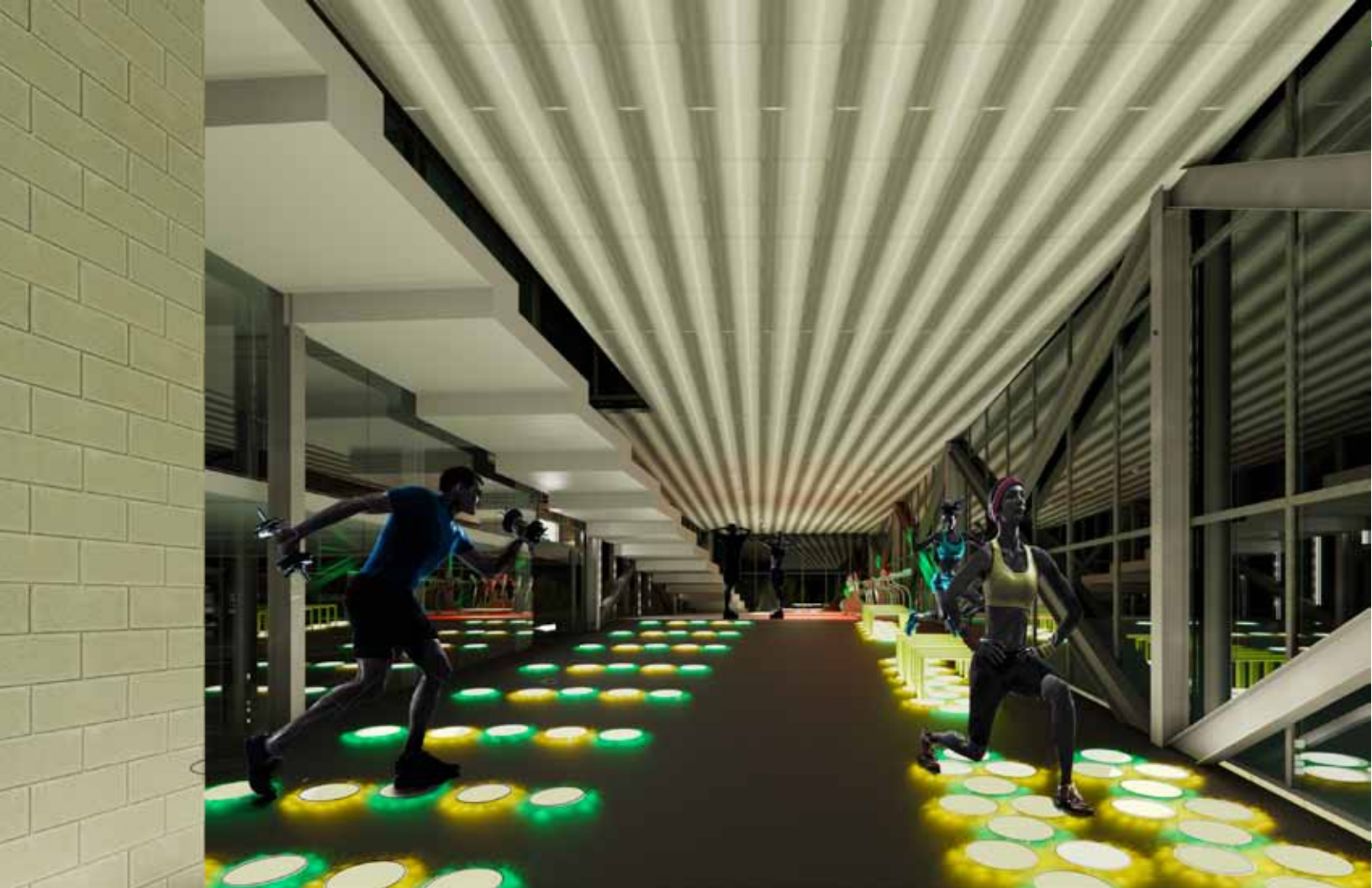
West Elevation of New Structure
Scale 1:16



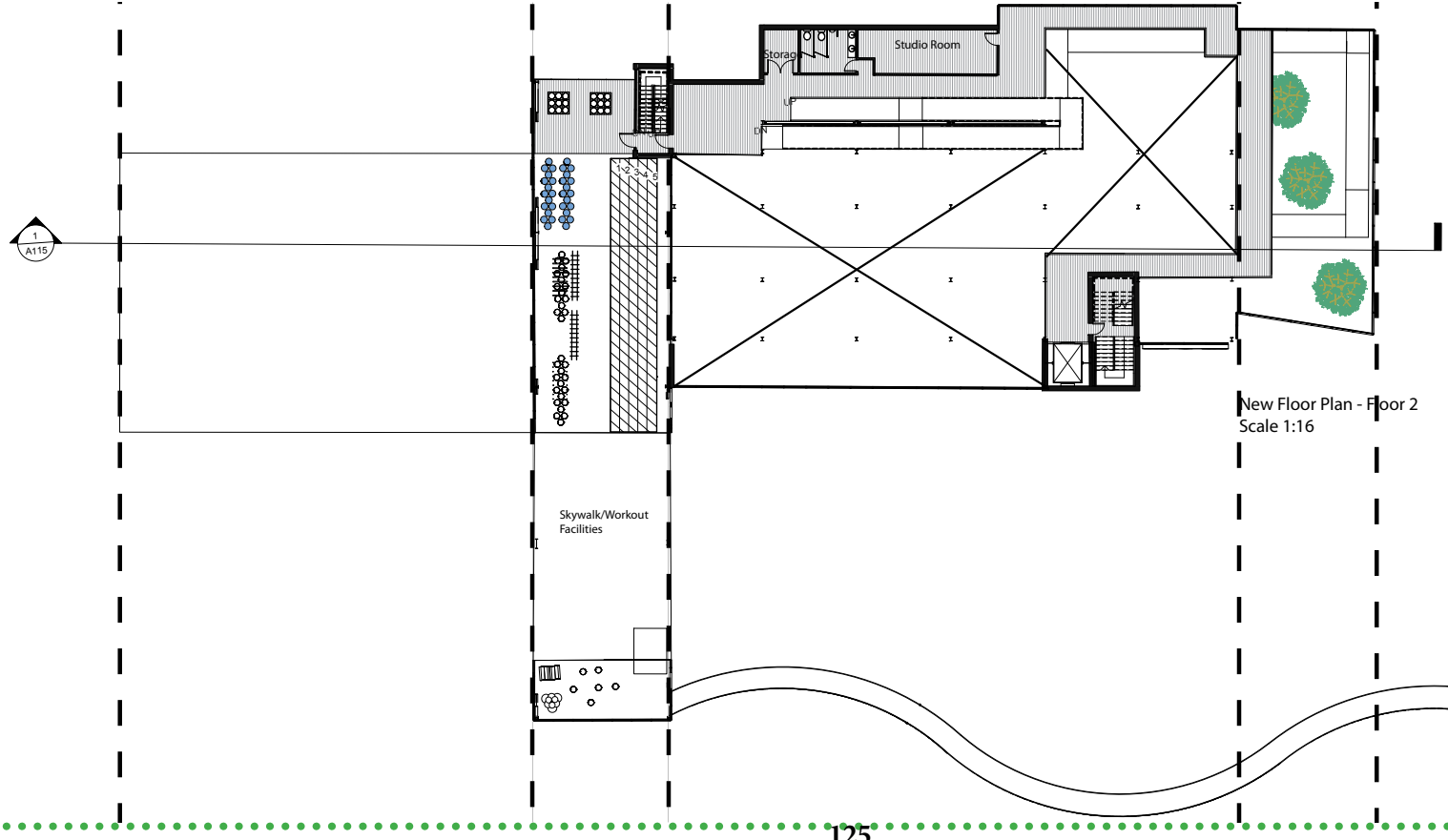
FIRST FLOOR



New Floor Plan - Floor 1
Scale 1:16

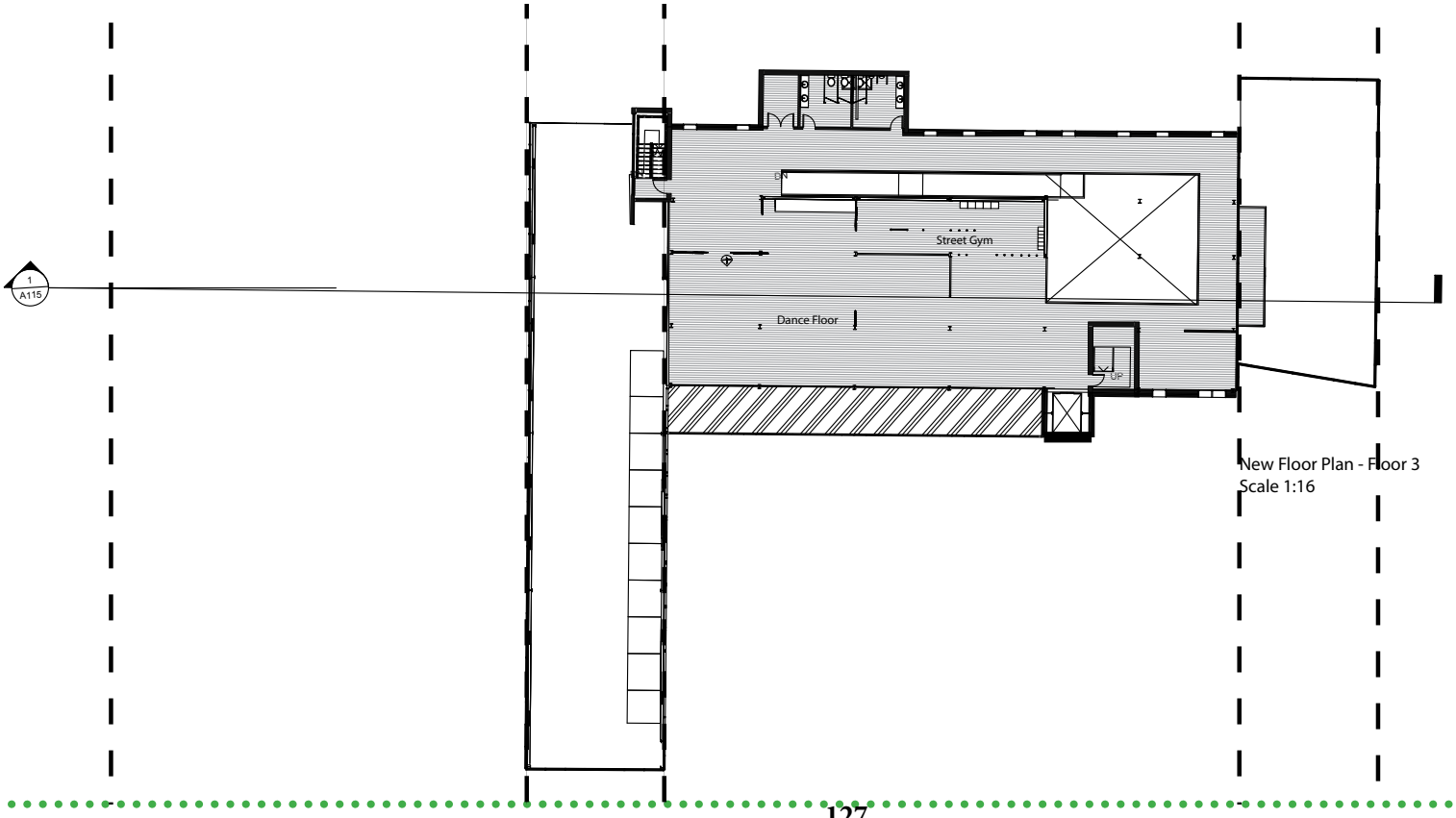


SECOND FLOOR



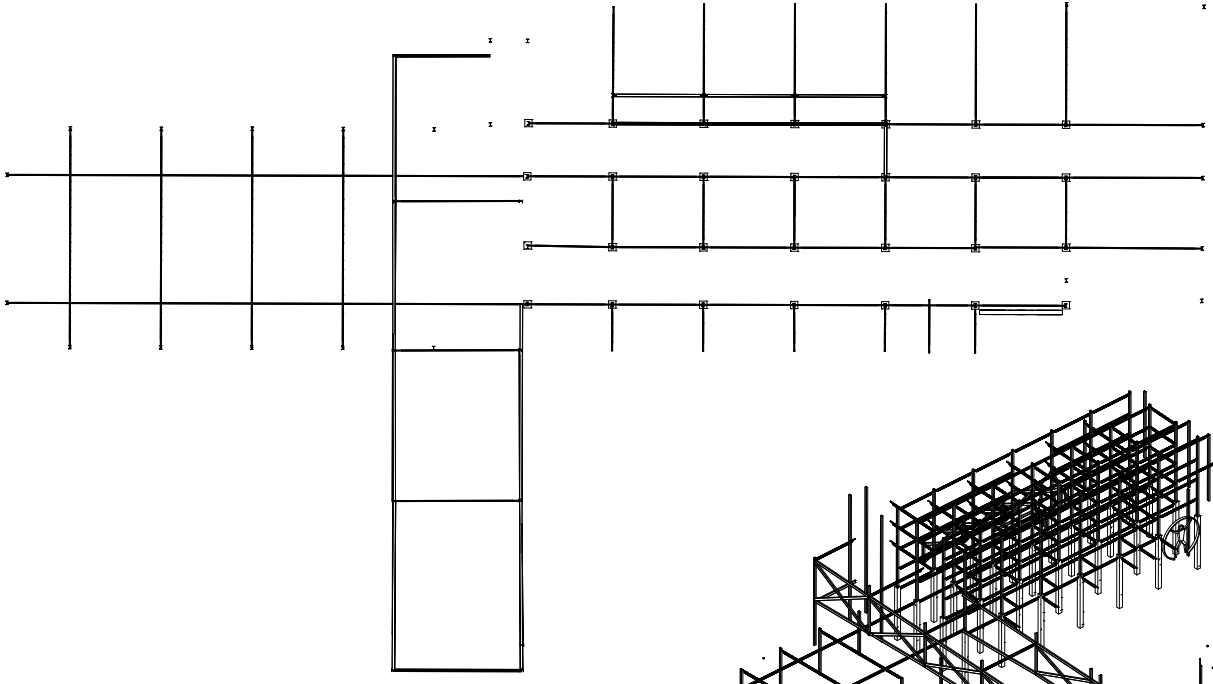
New Floor Plan - Floor 2
Scale 1:16

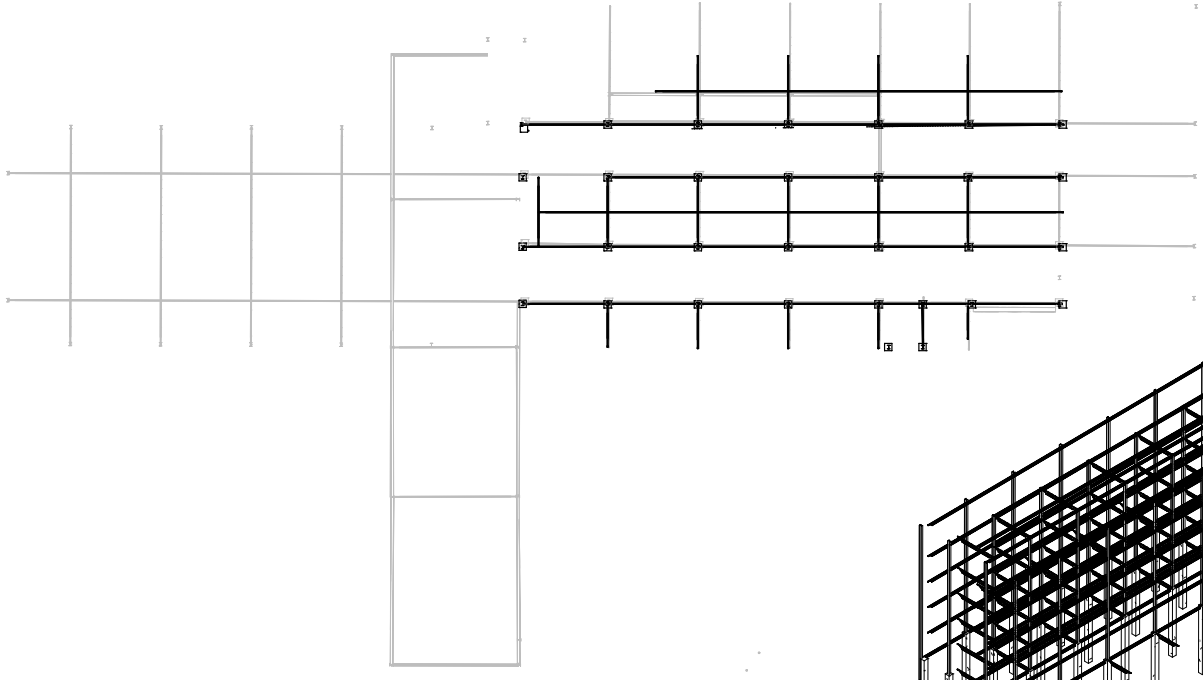
THIRD FLOOR

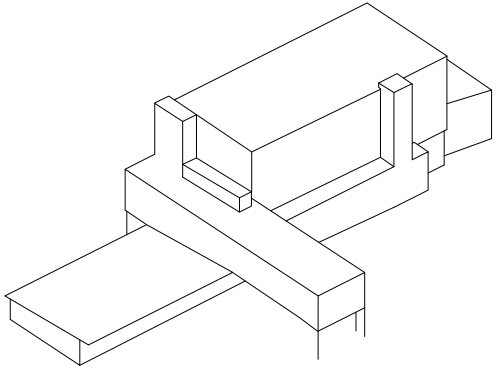


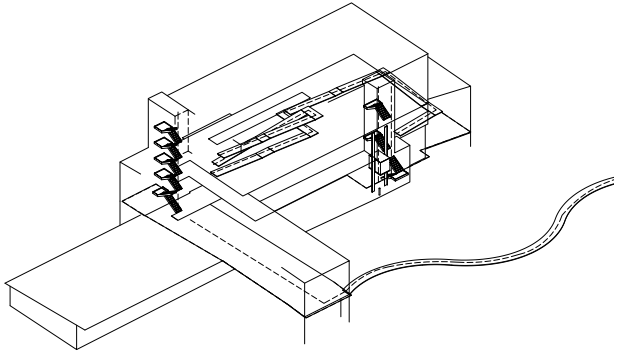
New Floor Plan - Floor 3
Scale 1:16

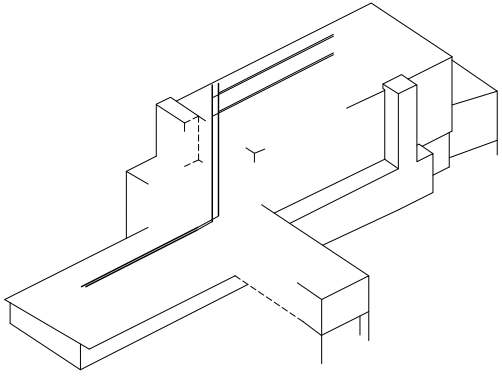
PROPOSED BUILDING STRUCTURE

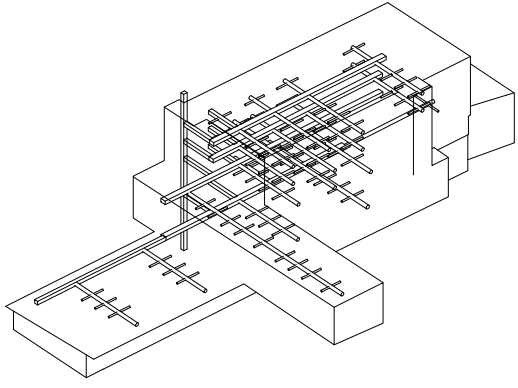




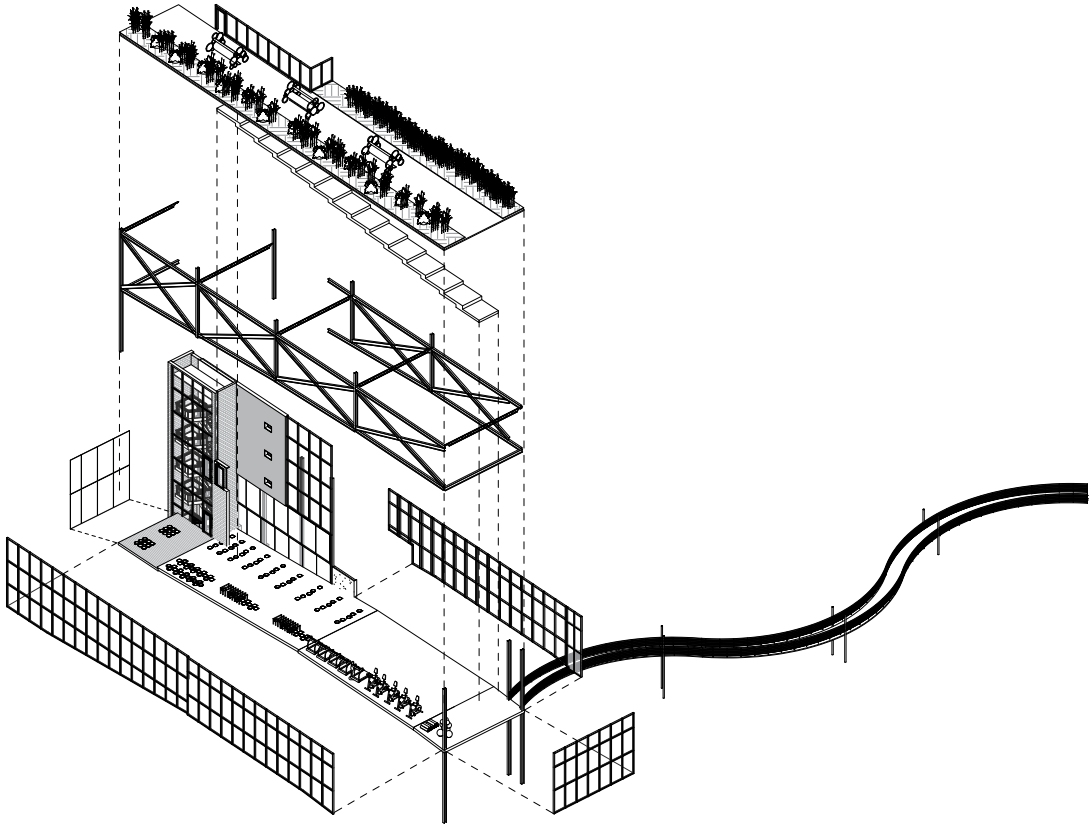








AXON STRUCTURE DIAGRAM OF SKYWALK



PHYSICAL MODEL OF EXISTING BUILDING